# A SURVEY OF THE BASIC MATHEMATICAL SKILLS IN ELEMENTARY SCHOOLS IN MISSISSIPPI

By

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The major purpose of this survey study was to determine the emphasis placed on basic mathematical skills by public elementary school teachers in Mississippi and the importance that those teachers attach to the basic mathematical skills.

The list of basic mathematical skills used for this study was the list of skills developed in the Florida Department of Education--University of Florida Basic Skills Project. For this study the basic skills were separated into two categories, pre-literacy, and basic literacy. In each of these categories, topics were identified and specific skills were listed for each of these topics. The topics identified for each level were

1. Pre-literacy (grades 1-3)
   a. Conservation of numerousness
   b. Counting
   c. Identification of numerals
   d. Measurement without number
   e. Measurement with number

2. Basic Literacy (grades 4-6)
   a. Identification of numerals
   b. Operations with numbers
   c. Measurement without number
   d. Measurement with number

The 82 counties in Mississippi were stratified into eight levels according to the number of elementary schools per county. A random sample of counties from each stratum was selected and schools were randomly selected from each of these counties. A total of 71 schools agreed to participate in the study and 43 schools returned a usable set of questionnaires. There were 250 teachers of grades one through three and 140 teachers of grades four through six in this sample.

The set of questionnaires for each school consisted of the following.

1. A questionnaire for the principal requesting general information about the school (enrollment, number of teachers, etc.).

2. A general questionniare to be completed by each teacher requesting general information about the teacher (teaching experience, educational background, etc.).

3. A "pre-literacy" questionnaire for teachers of grades 1-3. This questionnaire requested information relating to a set of basic mathematical skills. Teachers were asked to rate the emphasis placed on and the importance attached to each of these skills.

4. A "basic literacy" questionnaire for teachers of grades 4-6. This questionnaire requested information relating to a set of basic mathematical skills. Teachers were asked to rate the emphasis placed on and the importance attached to each of these skills.

The data from the general questionnaire were used to place the responses to the skills questionnaires into appropriate units for comparisonn. A summary of the responses for the pre-literacy and basic literacy levels was prepared for each of the following:

1. Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years experience.

2. Teachers taking no mathematics course in the last 5 years versus teachers taking one or more mathematics courses in the last 5 years.

3. Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics.

4. Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later.

5. Teachers who teach in schools that have a basic skills program versus teachers who teach in schools that do not have a basic skills program.

6. Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more.

The data were used to determine possible differences in the emphasis placed on basic mathematical skills and the importance attached to the skills by the groups of elementary teachers indicated above. The chi-square statistic was used to detect differences in the emphasis placed on and the importance attached to the skills for both pre-literacy (6 categories) and basic literacy (4 categories) skills.

# CHAPTER I
# THE NATURE OF THE STUDY

The major purpose of this study was to determine the emphasis placed on basic mathematical skills by elementary school teachers in Mississippi public schools. A questionnaire was designed to determine the emphasis on a set of basic skills and to assess the importance that teachers attach to the teaching of each of the skills. Since the importance that elementary school teachers attach to the basic skills would be one outcome of the study, the information obtained should be of use to teachers and mathematics educators in planning an appropriate elementary school mathematics curriculum and in preparing the teaching materials to be used for that curriculum.

## The Problem

The problem of this study was to analyze the content of elementary school mathematics programs in Mississippi as they compare to a given list of basic mathematical skills. The purpose of the study was to determine (1) the emphasis placed on certain basic skills in the teaching of elementary school mathematics; and (2) the importance attached to each of these basic skills by elementary teachers.

The list of basic mathematical skills used for this study was the list of skills developed in the Florida Department of Education--University of Florida Basic Skills Project (Powell, Bolduc, Crews, Kantowski, Smith, and Wenzel, 1976). The basic skills were separated into three categories: pre-literacy, basic literacy, and career literacy. In each

of the categories, topics were identified and specific skills were listed for each of these topics.

This study was designed to determine which of the basic skills were being taught by elementary school teachers, the emphasis placed on each skill, and the importance attached to the acquisition of each skill.

Criticism of the current elementary school mathematics programs and demand for a return to basic skills directed the definition of the problem and the formulation of the hypotheses of the study.

## Importance Of The Study

In the late 1950's and early 1960's dramatic changes were made in the elementary school mathematics programs. The new mathematics programs, frequently called "new math" or "modern math," included topics that were new to the elementary school; new approaches to old topics; and more emphasis on the understanding of mathematical concepts. During the 1970's the new mathematics programs have been the object of much criticism. Critics have claimed that the current elementary school mathematics programs do not place enough emphasis on basic skills. These critics, in general, would like a return to the "basics."

The question of what mathematics should be taught has been raised frequently throughout the history of mathematics education in the United States. This question was significant during the late 1950's and early 1960's and has taken on new significance during the 1970's because of the increasing demand for a knowledge of basic skills in mathematics.

Mathematics educators have contended that basic skills are and have been an integral part of elementary school mathematics programs and, therefore, there is no need for a return to the "basics" (Pharis,

1976). One outcome of this study was a determination of the emphasis placed on basic mathematical skills by elementary school teachers.

## Definition Of Terms

There are several terms used throughout this study which require careful definition. "Basic skills," "literacy," etc., are terms which have different meanings to different people. The meanings attached to these terms in this study are those listed below.

### Basic Mathematical Skills

The basic mathematical skills are "the competencies and skills essential for enlightened citizens as shown by mathematics education research and other literature" (Powell et al., 1976, p. 113).

### Pre-Literacy Level Skills

"The pre-literacy level is a designated point in . . . skill acquisition that marks an indicator level of progress toward a more durable goal of basic literacy. That point is commonly the end of primary school (K-3)" (Powell et al., 1976, p. 5). Skills learned at this level of literacy are probably not permanent and subject to extinction.

### Basic Literacy Level Skills

"The basic literacy level is that approximate point in . . . skill acquisition where the skills that have been learned become permanent and are not subject to extincition . . .. Once individuals reach the basic literacy level they can, without further external instruction, increase

their own performance level" (Powell et al., 1976, p. 18). "The basic literacy skills are (in general) all introduced by grade five" (Powell et al., 1976, p. 102); however, all skills are not necessarily mastered at the fifth grade level.

### Career Literacy Level Skills

"Career literacy level is estimated to be a point where basic skill development and skill refinement would support an individual's entry into an occupational role" (Powell et al., 1976, p. 27). The mathematical skills at this level are those skills necessary in order for an individual "to move on to specialized, technical or professional levels" (Powell et al., 1976, p. 108).

## Limitations And Assumptions Of The Study

The subjects in this study were a selected sample from a specific population--the elementary public school teachers in Mississippi. Results and implications drawn from the data are applicable only to this population.

A basic assumption of this study was that the necessary data could be secured through the survey instruments and that the return of the survey instruments would provide an adequate sample of the population.

The set of skills used in the questionnaire was assumed to be a representative set of basic mathematical skills.

## Design Of The Study

This section contains a short overview of the procedures used in this study. These will be given in greater detail in Chapters III and IV.

The nature of the problem required the collection of data from elementary school teachers in Mississippi public schools. These data were collected by means of a set of questionnaires sent to a representative sample of the public schools in Mississippi. The school rather than individual teachers was used as the unit in determining the sample size.

The 82 counties in Mississippi were stratified into eight levels according to the number of elementary schools per county. A random sample of counties from each stratum was selected and schools were randomly selected from each county to insure a sample rate of 1:3.17.

The principals of the selected schools were contacted during the summer requesting a commitment for the participation of the school faculty in the survey. Principals were also asked to allocate time during the faculty meetings prior to the beginning of the 1978-79 school session for the faculty to complete the questionnaires. A questionnaire for each faculty member who was teaching mathematics was then sent to the principal who was responsible for the distribution of the questionnaires and their return.

The set of questionnaires for each school consisted of the following.

1. A questionnaire for the the principal requesting general information about the school (enrollment, number of teachers, etc.).

2. A general questionnaire to be completed by each teacher requesting general information about the teacher (teaching experience, educational background, etc.).

3. A "pre-literacy" questionnaire for teachers of grades 1-3. This questionnaire requested information relating to a set of basic mathematical skills. Teachers were asked to rate the emphasis placed on and the importance attached to each of these skills.

4. A "basic literacy" questionnaire for teachers of grades 4-6. This questionnaire requested information relating to a set of basic mathematical skills. Teachers were asked to rate the emphasis placed on and the importance attached to each of these skills.

The following series of questions related to the teaching of basic mathematical skills was used to develop the hypotheses of this study.

1. Does the number of years of teaching experience influence the emphasis placed on and the importance attached to the several basic skills?

2. Does the recency of the teacher's college degree influence the emphasis placed on and the importance attached to the several basic skills?

3. Does the teacher's continuing education in the mathematics area influence the emphasis placed on and the importance attached to the several basic skills?

4. Other questions considered in this study relate to:

   a. size of school
   b. teaching assignment
   c. time of day when mathematics is taught
   d. amount of school day spent teaching mathematics
   e. sex of teacher
   f. undergraduate major
   g. attitude of the teacher.

The hypotheses granted from this set of questions are listed in the next section.

## Hypotheses

The questions generated in the previous section led to several groupings of the respondents: $(G_x: x \in \{1, 2, \ldots, 14\})$.

$G_1$: Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience.

$G_2$: Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years.

$G_3$: Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics.

$G_4$: Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later.

$G_5$: Teachers who teach in schools that have a basic skills program versus teachers who teach in schools that do not have a basic skills program.

$G_6$: Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more.

$G_7$: Teachers who have a concentration in mathematics versus teachers who do not have a concentration in mathematics.

$G_8$: Teachers who teach mathematics only versus teachers who teach mathematics and other subjects.

$G_9$: Teachers who teach mathematics during the morning versus teachers who teach mathematics during the afternoon.

$G_{10}$: Male teachers versus female teachers.

$G_{11}$: Teachers whose undergraduate major was elementary education versus teachers whose undergraduate major was not elementary education.

$G_{12}$: Teachers who rated mathematics as the subject "most enjoyable for me to teach" versus teachers who did not rate mathematics as the subject "most enjoyable for me to teach."

$G_{13}$: Teachers who rated mathematics as the subject "I feel most competent to teach" versus teachers who did not rate mathematics as the subject "I feel most competent to teach."

$G_{14}$: Teachers who rated their feeling toward mathematics as 5 or less versus teachers who rated their feeling toward mathematics as greater than 5.

The statements of basic skills used in the questionnaires were grouped according to several categories.

Pre-Literacy--grades 1-3 $(P_x: x \in \{1, 2, \ldots, 6\})$

$P_1$: Conservation of numerousness

$P_2$: Counting

$P_3$: Identification of numerals

$P_4$: Operations with numbers

$P_5$: Measurement without number

$P_6$: Measurement with number

Basic Literacy--grades 4-6 $(B_x: x \in \{1, 2, 3, 4\})$

$B_1$: Identification of numerals

$B_2$: Operations with numbers

$B_3$: Measurement without number

$B_4$: Measurement with number

$H_1$: There is no significant difference in the emphasis placed on $P_x$ by teachers of grades 1-3 in grouping $G_x$.

$H_2$: There is no significant difference in the importance attached to $P_x$ by teachers of grades 1-3 in grouping $G_x$.

$H_3$: There is no significant difference in the emphasis placed on $B_x$ by teachers of grades 4-6 in grouping $G_x$.

$H_4$: There is no significant difference in the importance attached to $B_x$ by teachers of grades 4-6 in grouping $G_x$.

## Organization Of The Study

Chapter I of this study includes the statement of the problem; the importance of the study; definitions of terms used in the study; limitations and assumptions of the study; design of the study; and the hypotheses of the study.

Chapter II contains a review of research and other literature related to the study.

Chapter III contains a description of the procedures used in the study. This chapter includes a discussion of the sample and the method used to select the sample. The survey instruments and the procedures used in collecting and analyzing the data are also discussed.

Chapter IV contains an analysis of the data and the results of the study.

Chapter V contains a summary of the study and the conclusions drawn from the study.

## CHAPTER II
## REVIEW OF RELATED LITERATURE

### Introduction

The purpose of this study was to determine the emphasis placed on basic mathematical skills by the public elementary school teachers in Mississippi and the importance that those teachers attach to the basic mathematical skills.

Literature related to the problem is examined in this chapter. The irst section is a review of the literature concerning the back-to-basics trend. The second section is a review of literature regarding identification or definition of basic mathematical skills. The third section is a review of the research involving one or more of the skills considered basic mathematical skills in this study.

### The Back-To-Basics Trend

The back-to-basics movement focuses on drill in the three Rs (Brodinsky, 1977a; Kraus, 1978; Offner, 1978; and Weber, 1975). Several writers (Brodinsky, 1977b; Haley, 1977; Jarrett, 1977; Kraus, 1978,; NCSM, 1977; NCTM, 1977; Rouse, 1977; Taylor, 1977; and Trafton and Suydam, 1975) have expressed concern that back-to-basics advocates really want elementary school mathematics programs to go back to total emphasis on computation. In 1974 in Los Angeles ("Reforms That Went Sour," 1974), grade school teachers were told to spend a minimum of five minutes a day on computation. During the same year, the state

legislature in California passed a resolution directing the State Board of Education to adopt a new mathematics textbook series which emphasized computational skills. Brodinsky (1977b) suggested that computational skills were only a starting point for the improved mathematics education that today's students need. Rouse (1977) indicated that the need for a high level of computational ability no longer exists in our society. Both NCSM (1977) and NCTM (1977) indicated strong support for mathematics programs that emphasize computational skills; this emphasis, however, must be within the context of total mathematics instruction. Computation is only a part of the total mathematics program. Wolfe (1976) described the importance of computational skills as a part of current mathematics programs and gave a warning regarding problems that would be created by a complete return to total emphasis on computation. Trafton and Suydam (1975) stressed the role of computation as one element in a comprehensive mathematics program. Taylor (1977) expressed the concern that the back-to-basics trend would result in instruction that stressed computation and neglected other mathematical skills. Visor (1974) indicated that the development of computational skills is basic to any mathematics program, but the major goal of elementary school mathematics should be the development of students' understanding of numbers and number relationships, basic operations, and the structure of the numeration system. In response to an editorial by Ronald Reagan calling for a return to the basics, Haley (1977) stated that "rules without reason, drills without meaning, writing and reading without imagination, and mechanical expression by itself are basics for turning out a nation of robots, not human beings" (p. 77).

According to a National School Boards Association survey (Brodinsky, 1977a), few boards have adopted formal back-to-basics programs even though four-fifths of the nation's school boards believe their schools should put greater emphasis on reading, writing, and arithmetic. Many schools indicate that they have been, are, and will continue teaching basic skills. Schools are focusing attention on any project or activity that deals with basic skills in an attempt to satisfy advocates of the back-to-basics movement.

Many writers have listed causes for or forces behind the back-to-basics movement. Meiring (1977) listed the following five forces as the major forces behind the movement. The first is nostalgia--a desire to go back to a time when schools emphasized the 3 Rs and demanded discipline. The second force is publicity--attitude toward the basics has become an educational issue because of the publicity. The third major force is the current curriculum--students are not acquiring basic mathematical skills with the present curriculum. The fourth is economic pressure--the demand for accountability. The fifth force, Meiring calls "future shock"--"the inability of education to react quickly enough to the changing needs society has for education" (p. 7). Van Til, Brownson, and Hamm (1975) agreed that the movement is partially due to a nostalgia for the past which is seen as secure. They also indicated that the movement is a reflection of social uneasiness, public attitudes toward schools, the concern of parents, and a challenge to current curriculum materials.

Brody (1977), Glennon (1976), Heller (1977), Henderson (1975), Kraus (1978), Lawson (1973), Mottl and Cawelti (1978), and Taylor (1977) indicated that the major cause of the back-to-basics trend was the

decline in scores by students on standardized achievement tests. In addition to declining scores on achievement tests, Taylor (1977) cited results of national assessment tests, rising costs of education, the accountability movement, and an increasing awareness of the need for remedial and compensatory programs as causes for the trend. According to Heller (1977) the trend implies that basic skills have not been taught in recent years or have not been taught well.

Critics have claimed that the current elementary school mathematics programs do not place enough emphasis on basic skills (Bender, 1972; Henry, 1971; Kline, 1973; Lazarus, 1975; and Rappaport, 1976). These critics argued that the "new math" was responsible for the lack of emphasis on basic skills and, therefore, the decline in scores on standardized achievement tests. Davis (1974) cited the decline in computational skills as the major source of controversy over the "new math."

According to the National Advisory Committee on Mathematical Education Report (1975), there was little evidence that the "new" mathematics programs were ever actually implemented at the elementary school level. The Report noted that few efforts were made to educate elementary teachers in regard to the content and thrusts of the "new" mathematics; therefore, the teachers continued to emphasize content that they felt competent to teach: computational skills with the whole numbers, fractions, and decimals. Swart (1974) said that elementary school students are learning the same things they learned twenty years ago: "to get answers to exercises in addition, subtraction, multiplication, and division of whole numbers, decimals, and fractions" (p. 7). In a radio broadcast on back-to-basics, Joseph Cronin (1977)

reported that students in elementary schools in Illinois and elsewhere in the United States are working on basic skills for three or four hours a day and neglecting the remainder of the curriculum. Cronin felt that it is possible that most schools never left the basics. In an article in defense of the "new" mathematics, Ballew (1977) claimed that any deficiencies in computational ability are not the fault of the "new" mathematics since there is no evidence that traditional ways of doing computation ever left the curriculum. Pharis (1976) advocated looking "forward to the basics." He indicated that it would not be possible to go "back to the basics" because the elementary schools never adandoned their concern for basics. Down (1977) agreed that the trend should be forward to basics since elementary schools never completely left basic subjects.

Offner (1978), Pharis (1976), and Sava (1975) cited several misconceptions of the back-to-basics advocates. The most common misconception is the idea that at one time elementary school mathematics teachers effectively conveyed basic mathematical skills to children. Sava noted the status of elementary school mathematics in the late 1950's and early 1960's as evidence of the failure of pre-new-math in regard to the acquisition of basic mathematical skills by students. Amundson (1976) stated that the back-to-basics movement is "a societal reaction to generalizations, excesses, misdirection, misunderstandings, and in some instances, ill-advised philosophies and practices that have emerged in our schools during the past quarter century" (p. 2). He also indicated that teaching basic skills has always been of "top priority importance" in many elementary schools.

The concern over acquisition of basic skills has caused many states to pass legislation regarding minimum competency testing programs (Brodinsky, 1977a; Gilman, 1977; Mottl and Cawelti, 1978; Sheils, 1974; and Streshly, 1977). Many schools and school districts are developing special programs for students who are weak in one or more basic mathematical skill areas (Brodinsky, 1977a; Cowan and Clary, 1978; Fulkerson and Gilmer, 1978; Gilman, 1977; Glennon, 1976; Hechinger, 1975; McCully, 1978; Owen and Ranick, 1977; Sheils, 1974; Streshly, 1977; and Zamiello, 1976). These programs identify skills that they consider basic mathematical skills, test for mastery of the skills, provide special courses or help for students who are weak in a skill, and retest to assure student competency in basic skills. Numerous activities have been developed and suggestions have been made to aid students in learning basic skills (Bereiter, 1973; Englehardt, 1976; Hansen and Hansen, 1973; Shaw, 1974; Silvia, 1977; and Wilderman, 1976). Experiments rather than tests have been used effectively by some teachers (Bacher, 1976) to determine whether students have really learned the basic skills. In England (Doe, 1978), the government has asked that a study be made of the current mathematics curriculum in comparison with the skills required for further education, employment, and adult life.

There is evidence of much concern regarding the teaching of basic mathematical skills. The literature seemed to imply that basic mathematical skills are and have been part of the elementary school mathematics curriculum. One of the purposes of this study was to determine the emphasis placed on basic mathematical skills by elementary school teachers.

## Identifying Basic Mathematical Skills

As concern over the teaching and learning of basic mathematical skills has increased, many writers and researchers have identified the skills that they consider to be the basic mathematical skills. Other writers have only given a broad description of the basic mathematical skills. Taylor (1977) described basic mathematical skills as the skills necessary for meeting the many challenges of today. Wilderman (1976) gave a more restrictive description--skills necessary for survival in a rapidly changing world. Clements (1977) described basic skills as a blend of basic literacy, the Golden Rule, economic and personal survival skills, and content proficiency.

Jarrett (1977) and Lemke (1977) both felt that the emphasis placed on basic skills in the schools was determined by the school's definition of basic skills. According to a Gallup poll on the improvement of public instruction, reported by Jarrett, the most popular suggestion was "devote more attention to teaching basic skills." Jarrett also proposed that basic skills be defined in a general way to include most of the school curriculum. This would eliminate the danger of defining basic skills as computation only.

Skills identified as basic in the past may not be basic skills at the present according to Brodinsky (1977b) and Higgins (1974). As an example, the need for the mathematical understanding that is necessary to make full use of calculators was described as a basic skill in today's schools. Brodinsky suggested the following list of skills as current basic mathematical skills: understanding of and ability to use calculators; computational skills; problem-solving; reading,

interpreting, and communicating through tables, charts, and graphs; use of mathematics to predict; and knowledge of use of computers.

The Roanoke Rapids Graded School District used a series of questionnaires to determine the essential mathematical skills (Cowan and Clary, 1978). Questionnaires were sent to a sample of local businesses and residents of the district. Two national samples were also selected: 100 large corporations and 100 large industrial companies. The responses to the questionnaires and a review of the literature on basic skills resulted in a list of 54 essential mathematical skills. This list was the basis for the development of a test-teaching program for the district.

In response to the question "what are basic mathematical skills?", the National Council of Supervisors of Mathematics (1977) published a position paper listing the following ten basic skill areas: 1) problem-solving; 2) applying mathematics to everyday situations; 3) alertness to the reasonableness of results; 4) estimation and approximation; 5) appropriate computational skills; 6) geometry; 7) measurement; 8) reading, interpreting, and constructing tables, charts, and graphs; 9) using mathematics to predict; and 10) computer literacy. The NCSM suggested that many activities and materials be used in teaching these basic skills.

A similar list was published by the Committee on Basic Mathematical Competencies and Skills (NCTM, 1972). The Committee identified ten skill areas and specific skills within each area which were considered the minimum skills needed by enlightened citizens. In another list of essential mathematical skills, Bell (1974) identified 13 mathematical skills that "everyman" should acquire through school mathematics programs.

One of the major purposes of the Euclid Conference on Basic Mathematical Skills and Learning (National Institute of Education, 1975a, 1975b) was to consider answers to the question "what are basic mathematical skills and learning?" Thirty-three position papers were presented in response to that question. In Rising's summary (NIE, 1975a) of the position papers, he defined basic mathematical skills as "those mathematics-related abilities that should be attained in order to function as a citizen" (p. 149). Rising identified three basic skill areas: computation, geometry and mensuration, and problem-solving.

Bolduc and Kantowski (Powell et al., 1976) reviewed the research and related literature and compiled a comprehensive list of basic mathematical skills. The skills were separated into three categories: pre-literacy, basic literacy, and career literacy. In each category, topics were identified and specific skills were listed for the topics.

There was no list of basic mathematical skills that was agreed upon by mathematics educators as the basic mathematical skills. The list of basic skills that was used in this study was the list presented by Bolduc and Kantowski.

## Research On Basic Skills

The National Assessment of Educational Progress began assessment of various subject areas in the late 1960's (Suydam and Osborne, 1977). The first mathematics assessment by NAEP was conducted during 1972-73. The assessment included six major content areas: number and numeration, measurement, geometry, variables and relationships, probability and statistics, and consumer mathematics. Approximately 90,000 students at ages 9, 13, and 17, plus 4000 young adults aged 26-35, were tested.

Data were analyzed in terms of age, sex, race, region, level of parental education, and community size and type.

Results of the 1972-73 assessment (Carpenter, Coburn, Reys, Wilson, 1975a, b, c, d, e; 1976a, b, c, d, e) indicated that students' performance was reasonably strong in the areas of whole-number computation, knowledge of numeration concepts, analysis of one-step story problems, practical measurement concepts, and recognition of basic geometric figures and relationships. Weaknesses were indicated in the areas of percent, development of fraction concepts, complex word problems, measurement tasks, and understanding of geometry topics. In the area of whole-number computation, 13-year-olds performed at about the same level as adults and 17-year-olds performed at a higher level than adults. The 9-year-olds performed reasonably well on whole-number computation. The 13-year-olds' responses indicated that computational algorithms for all four operations are well developed by the latter part of elementary school. On consumer exercises, the adults performed consistently higher than the 17-year-olds. Continuous gains in performance were made from the 13-year-olds to the young adults with the most dramatic gains being made from the 13-year-olds to the 17-year-olds. This data seemed to indicate that students were learning skills necessary for solving consumer problems while in school.

Data from the assessment also indicated that 13- and 17-year-olds need to develop more problem-solving skills, estimation skills, understanding of percents, and skills with fractions. In the area of numbers and numeration (Carpenter et al., 1975b), the data provided evidence that the 9-year-olds were developing a good foundation for an understanding of numeration. Results indicated that 94% could count by 10's,

75% could read a 4-digit number and name the digit in the tens place, and 87% could write a 3-digit number expressed in words.

The NACOME Report (1975) reported a trend of declining test scores for the past ten years. The Committee found that an increasing portion of a student's mathematics education was devoted to simply developing arithmetic computational skills. The results of the NAEP on computation support this finding. This supports the theory that computational skills are being developed while the remainder of the mathematics curriculum is neglected.

Hungerman (1975) compared the achievement of sixth graders in ten Michigan schools for the years 1965 and 1975. Data were analyzed in terms of scores on the fundamentals part of the California Achievement Test, age, sex, and IQ. Results indicated no significant difference in computational skills between 1965 and 1975 in total score; the 1975 group, however, scored higher on whole number computation but lower than the 1965 group on fractions and decimals. Hungerman also found that changes in textbook series and organizational patterns had generated no significant improvement or loss in total computational skills achievement.

In a study of the same type but using the period 1960 through 1969, Hammons (1972) found very different results. Using a selected sample of Louisiana schools, he found a significant declining trend in proficiency of computational skills during the 1960-1969 period with no schools reporting an increasing trend.

An investigation by Uprichard and Collura (1977) was designed to determine the effect of emphasizing mathematical structure in the acquisition of addition and subtraction computation skills with whole

numbers by seven- and eight-year-olds. A test was constructed to measure the computation skills (addition and subtraction), place value, and number concepts of students from a middle class elementary school in Tampa, Florida. Instruction for the experimental group emphasized the structure of mathematics, place value, the associative property, and number concepts. Instruction for the control group emphasized drill. The researchers found that emphasizing mathematical structure in instruction facilitates the development of number concepts, place value, and computational skills (addition and subtraction) in seven-and eight-year-olds.

The State Department of Education in Maryland conducted a statewide needs assessment project to determine the mathematics goals that were important to the general public (Hershkowitz, Shami, and Rowan, 1975). Results indicated that to the general public (23,990 persons) mathematics for mathematics' sake is not important; however, if mathematical concepts and skills are presented in a way that they can be applied to the solution of real life problems, they become of highest importance.

A special emphasis on problem-solving for everyday life was cited as one reason for the success of a learning laboratory approach to the teaching of basic skills to tenth, eleventh, and twelfth graders in a culturally deprived area (Borota and Veitch, 1970). The learning laboratory program also emphasized the everyday use of measurements; expression of mathematical ideas stressing the ability to use and understand graphs, tables, formulae, percentages, and symbols necessary for effective living; and fundamental skills of arithmetic, including an understanding of the number system, the concept of place value, the

operations involving whole numbers, common fractions, and decimal fractions.

Long and Herr (1973) conducted a study to determine the basic mathematical skills needed in vocational education. A random sample of 260 teachers representing various vocational education specialities were asked to identify skills (from a list of 66 basic mathematical skills) essential for their speciality and to identify the skills lacked by students entering their speciality. The list of 66 skills was compiled from standard or remedial mathematics textbooks. Results of the study indicated that the skills most essential to vocational education include the "four fundamental operations with whole numbers, basic uses of fractions and decimals, rule reading, and rounding numbers" (p. 62). The data also indicated that the skills generally weak and in need of remediation include "square root, use of fractions and decimals, ratio and proportion, percentage, and reading a rule" (p. 62).

Weak students showed progress in acquisition of skills through a project designed by Beeson and Walsh (1976). Students in a single self-contained fifth grade class at Westdale Elementary School, Baton Rouge, Louisiana, were given an Adston Diagnostic Instrument to pinpoint specific difficulties in the four basic operations of arithmetic. Using the test results, students were grouped according to their difficulties. Instruction in basic skills followed a diagnose, group, teach cycle. In addition to the progress in skill acquisition made by weak students, many students experienced success with mathematical operations for the first time in several years which produced an improvement in student attitude.

Starr (1977) found no apparent relationship between drill and student attitude toward mathematics. An experimental and a control group of low ability eighth grade students in a suburban St. Louis, Missouri, school district were compared during the 1971-1972 school year. There was no evidence that the use of traditional computational drills and lecture increased student achievement to a significant degree as compared with the achievements of students in "modern" mathematics who were not exposed to drill and lecture.

In another study of student achievement, Wasden (1971) compared achievement in arithmetic skills for students in traditional classrooms and students using individualized instruction. The students in traditional classrooms scored higher on arithmetic skills than students who were using individualized instruction.

Using 62 randomly selected schools and 1239 seventh, eighth, and ninth grade students, Nieman (1974) administered a test to determine the degree to which the students had acquired the minimum mathematical competencies described by the Committee on Basic Mathematical Competencies and Skills of the National Council of Teachers of Mathematics. The eighth and ninth grade students' achievement was statistically greater than the seventh grade students on 37 of 48 competencies. Nieman found that the size of the school system had no effect on the degree to which students had obtained the minimum mathematical competencies. The data also indicated that there was no difference in attainment by seventh and eighth grade students attending schools employing some type of grouping practices and students attending schools with no grouping practices.

Norland (1971) compared the mathematics achievement scores for students in grades six and eight in five schools in suburban communities north of Chicago. Achievement test results for arithmetic computation and for arithmetic problem-solving were compared for groups of students having had five or more years of instruction using modern mathematics materials and groups of students having had instruction using primarily traditional materials. Studies on computation favored the traditional group for three out of five cases at both the sixth and eighth grade level. For problem-solving, two out of five cases favored the traditional group at the sixth grade level and one out of five at the eighth grade level. Norland concluded that overall the evidence indicated that the traditional group performed slightly higher than the modern group.

In another study involving sixth and eighth grade students, Roderick (1974) made the following comparisons of achievement test scores: 1936 to 1973, 1951-55 to 1973, and 1965 to 1973. Scores on the Iowa Test of Basic Skills were available for the sixth and eighth graders for the years involved in the study. Results indicated that both sixth and eighth grade students in 1936 were superior to those in 1973 in every area tested and were far superior in the areas of problem-solving, whole number computation, fractional number computation, decimals, percentages, and fractional concepts. Mathematical achievement of students in 1951-55 was superior to that of students in 1973 in the areas of whole number computation and fractional number computation at the sixth grade level and in decimals, percentages, and problem-solving at the eighth grade level. Both sixth and eighth grade students in 1965 were superior to those in 1973 in problem-solving. Roderick

concluded that 1973 student achievement in problem-solving was at the lowest level of any of the years involved in his study.

In a synthesis of research of basic skills, Gow (1977) reported that emphasis on the learning of content had a significant relationship to student achievement and that time spent on content was significantly associated with growth in achievement in verbal ability, reading comprehension, and mathematics. Gow's report included evidence of this relationship found by the International Education Association in a survey relating mathematics achievement to time spent in learning. The IEA survey found that the opportunity to learn a subject, that is, time actively engaged, had a significant effect on achievement. Cooley and Leinhardt (1975) found that class means were higher if teachers allotted more time to mathematics each day.

A study by Stallings and Kaskowitz (1974) indicated that academic time spent on reading and mathematics resulted in growth and time spent on nonacademic areas detracted from growth in reading and mathematics. They concluded that the stronger the academic emphasis the more obvious the results. Rosenshine (1976) supported this conclusion. He indicated that content covered, opportunity to learn, and teacher emphasis on student achievement were important variables in achievement in mathematics.

## Summary

The literature indicated a demand for emphasis on basic mathematical skills by classroom teachers. The trend toward the use of minimum competency testing indicated the need for teaching basic skills. The literature indicated that basic skills are and have been an integral

part of elementary school mathematics programs. There was no indication of the importance attached to the basic skills in mathematics by elementary school teachers.

Many efforts have been made to identify the basic mathematical skills; however, there has been no agreement by mathematics educators regarding a list of basic mathematics skills. The list compiled by a search of the literature seemed to be the most comprehensive list.

The research on basic skills indicated that the skills are being taught; there was no indication, however, of the amount of emphasis placed on basic mathematical skills by elementary school teachers. There was evidence that the acquisition of basic mathematical skills is an important educational issue.

# CHAPTER III
# PROCEDURES

This chapter contains details concerning the selection of schools to participate in the study and a discussion of the procedures used in collecting and analyzing the data. Questionnaires used for data collection are presented in Appendix A.

## The Sample

The problem of this study was to analyze the content of the mathematics programs in the public elementary schools in Mississippi to determine a) the emphasis placed on a set of basic mathematical skills, and b) the importance attached to the skills by the teachers.

The school was used as the unit in the sample and all teachers in the selected elementary schools who were responsible for teaching mathematics were participants in the study. A total of 71 schools agreed to participate in the study. There were 43 schools that returned a usable set of questionnaires. (Table 1).

The Mississippi Educational Directory listed the schools by counties. Data were available for all 82 of the counties. The number of elementary schools per county ranged from zero (Issaquena County) to 45 (Hinds County). The counties were stratified according to the number of elementary schools per county and a random sample of six counties from each stratum was selected. Schools were randomly selected within the six counties.

Table 1

NUMBER OF SCHOOLS PER STRATUM AND
NUMBER OF SCHOOLS PARTICIPATING

| Stratum | Size of Counties by Number of Schools | Number of Schools Agreeing to Participate | Number of Schools Actually Participating |
|---|---|---|---|
| I | 18 or more | 13 (26.5%) | 9 (18.4%) |
| II | 14 - 17 | 18 (64.3%) | 11 (39.3%) |
| III | 9 - 13 | 11 (34.3%) | 8 (25.0%) |
| IV | 6 - 8 | 10 (33.3%) | 3 (10.0%) |
| V | 5 | 5 (38.5%) | 3 (23.1%) |
| VI | 4 | 5 (33.3%) | 1 ( 6.7%) |
| VII | 3 | 6 (54.5%) | 4 (36.4%) |
| VIII | 0 - 2 | 3 (37.5%) | 2 (25.0%) |
| Total | | 71 | 41 |

Two of the schools that actually participated were not identified so it was impossible to determine the stratum for those two.

In July 1978 letters were sent to the principals of the selected schools requesting a commitment from the principal for the participation of the school faculty in the study (Appendix B). The number of schools agreeing to participate in the study and the number actually participating is given in Table 1.

Principals were asked to allocate time during pre-school faculty meetings at the beginning of the 1978-79 school session for the teachers to complete the questionnaires. A questionnaire for each faculty member who was teaching mathematics was sent to the principal who was responsible for the distribution, collection, and return of the questionnaires. The principals were also asked to complete a brief questionnaire asking for general information about the school (Appendix B). A summary of the study was mailed to each participating principal. This summary contained results from his or her school as well as data from the entire sample.

## Construction Of The Questionnaires

Each teacher in the schools participating in the study was asked to complete two questionnaires. The first questionnaire requested general information and was completed by every teacher. The second questionnaire requested information regarding the emphasis placed on a set of basic skills in teaching elementary school mathematics and the importance teachers attached to these basic skills. There were two forms of the second questionnaire, one for teachers of grades one through three and a second form for teachers of grades four through six. The difference in the set of basic skills at the different grade levels

necessitated the use of two questionnaires. The principal was also asked to complete a questionnaire.

The Principal's Questionnaire

The Mississippi Educational Directory for 1977-78 did not provide all of the necessary information about each elementary school. The approximate enrollment of each elementary school and the number of teachers who taught mathematics were not available. A brief questionnaire was designed and sent to the school principals of the selected schools requesting this and other general information (Appendix B). The principal was also asked to indicate the school's position with regard to a basic skills program.

The General Questionnaire

On the general questionnaire each teacher was asked to supply information regarding teaching experience, current teaching assignment, educational background, and membership in professional organizations related to the teaching of mathematics.

Since many elementary school teachers teach all the academic subjects to their students, the four areas (language arts, mathematics, science, and social studies) generally taught were listed and teachers were asked to rank these areas on a scale of four to one in two different ways. First, teachers were to rank the four areas in order from "most enjoyable for me to teach" down to "least enjoyable for me to teach." Second, teachers were to rank the four areas in order from "I feel most competent to teach in this area" down to "I feel least competent to teach in this area."

The Skills Questionnaires

The set of basic skills in mathematics used in constructing the second questionnaire was developed by the Florida Department of Education--University of Florida Basic Skills Project. In that project the basic skills were classified as pre-literacy level skills, basic literacy level skills, and career literacy level skills. The pre-literacy level skills include skills introduced in Grades K through three; the basic literacy level skills are generally introduced by grade five; and the career literacy level skills are built on both the pre-literacy and basic literacy levels. The mathematical skills at the career literacy level as defined by this group are those skills necessary for an individual to move on to specialized levels of education.

Pre-Literacy Questionnaire. The pre-literacy level skills were the basis for construction of the questionnaire designed for the teachers of grades one through three. Some of the skills classified as basic literacy skills were also included. The basic literacy level skills are built on the pre-literacy skills and, therefore, may be introduced by the end of grade three. The combination of these two levels of skills resulted in a list of thirty-six basic skills which constituted the first section of the questionnaire. Teachers were asked to rate each skill on a scale of one to four according to the amount of emphasis placed on that particular mathematical skill. A rating of one indicated that no emphasis was placed on that skill, and a rating of four indicated that a great deal of emphasis was placed on the skill.

The last section of the the questionnaire contained a list of twenty-four general skills which was compiled by condensing the thirty-six skills previously listed. For each of the twenty-four skills

skills previously listed. For each of the twenty-four skills teachers were requested to rate the skill on a scale of one to four according to the importance that they attached to that skill. A rating of one indicated that teachers attached no importance to the skill, and a rating of four indicated that teachers attached a great deal of importance to that skill.

Basic Literacy Questionnaire. The basic literacy level skills and the career literacy level skills were the basis for construction of the questionnaire designed for the teachers of grades four through six. The first section of the questionnaire was a list of thirty-eight basic skills. Teachers were asked to rate each skill according to the amount of emphasis placed on that skill. The rating scale used was the same scale used by teachers of grades one through three on their form of the basic skills questionnaire. The last section of this form of the basic skills questionnaire was a list of twenty-one general skills which was compiled by condensing the thirty-eight basic skills previously listed. Teachers were requested to rate each skill according to the importance that they attached to that skill. The rating scale was the scale used by teachers of grades one through three on their form of the questionnaire.

Although the two forms of the basic skills questionnaire used in this study were called pre-literacy skills and basic literacy skills, most of the career literacy skills were incorporated into the list compiled for teachers of grades one through three and/or the list compiled for teachers of grades four through six. Since the teachers involved in this study were teachers of grades one through six, the skills listed in the three categories of the Florida Department of Education--University of Florida Basic Skills Project were condensed

into two categories appropriate for the teachers participating in this basic skills survey.

## Collection Of The Data

One questionnaire was designed for teachers of grades one through three and another for teachers of grades four through six. The number of each type of questionnaire sent to the participating schools was dependent on the information provided by the principal. A cover sheet indicated whether the questionnaire was for a teacher of grades one through three or for a teacher of grades four through six. (Twenty-seven teachers of grades one through three and eleven teachers of grades four through six completed the wrong questionnaire.)

## Method Of Analysis Of The Data

Summaries were prepared for the responses for the pre-literacy skills and the basic literacy skills questionnaires. Responses to all questions on the general questionnaire were tabulated according to the two categories--pre-literacy level and basic literacy level. These categories were determined by the grade or grades taught by the teachers.

The data from the general questionnaire were used to place the responses to the skills questionnaires into appropriate units for consideration and comparison. A summary of the responses for the pre-literacy and basic literacy levels was prepared for each of the following:

1. Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience.
2. Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years.

3. Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics.
4. Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later.
5. Teachers who teach in schools that have a basic skills program versus teachers who teach in schools that do not have a basic skills program.
6. Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more.

Items were missing from several questionnaires resulting in incomplete data for a particular category. These instances will be noted in the presentation of the data in Chapter IV.

The data were used to determine possible differences in the emphasis placed on basic mathematical skills and the importance attached to the skills by the groups of elementary teachers indicated above. The chi-square statistic was used to detect differences in the emphasis placed on and the importance attached to the skills for both pre-literacy and basic literacy levels. Hypotheses were tested at the five percent level of significance. The data are presented in Chapter IV.

## CHAPTER IV
## PRESENTATION AND ANALYSIS OF RESULTS

This chapter contains the results obtained from the questionnaires and an analysis of the data used in testing the hypotheses.

The following hypotheses were not tested at the pre-literacy level or the basic literacy level.

$G_7$: Teachers who have a concentration in mathematics versus teachers who do not have a concentration in mathematics.

Three teachers of pre-literacy level skills indicated mathematics as an area of concentration and four teachers of basic literacy level skills listed mathematics as their only area of concentration.

$G_8$: Teachers who teach mathematics only versus teachers who teach mathematics and other subjects.

One teacher of pre-literacy level skills and twenty-one teachers of basic literacy level skills taught mathematics only.

$G_9$: Teachers who teach mathematics during the morning versus teachers who teach mathematics during the afternoon.

There was no way to test this hypothesis since almost all teachers taught mathematics at more than one time during the day.

$G_{10}$: Male teachers versus female teachers.

Only one male taught pre-literacy level skills and only nineteen males taught basic literacy level skills.

$G_{11}$: Teachers whose undergraduate major was elementary education versus teachers whose undergraduate major was not elementary education.

Of the 215 pre-literacy level teachers who listed an undergraduate major, only nineteen indicated a major other than elementary education and only 15 of 117 basic literacy level teachers indicated that elementary education had not been their undergraduate major.

$G_{12}$: Teachers who rated mathematics as the subject "most enjoyable for me to teach" versus teachers who did not rate mathematics as the subject "most enjoyable for me to teach."

The data collected were not sufficient to compare these two groups.

$G_{13}$: Teachers who rated mathematics as the subject "I feel most competent to teach" versus teachers who did not rate mathematics as the subject "I feel most competent to teach."

The data collected were not sufficient to compare these two groups.

$G_{14}$: Teachers who rated their feeling toward mathematics as 5 or less versus teachers who rated their feeling toward mathematics as greater than 5.

Only seven teachers of pre-literacy level skills rated their attitude toward mathematics as five or less and only two teachers of basic literacy level skills rated their feeling toward mathematics as five or less.

## Pre-Literacy Level--General

There were 250 teachers of grades one through three who completed the general questionnaire. The data obtained from this questionnaire are reported below according to the categories established by the set of questions (and hypotheses) developed in Chapter I.

Of the 250 teachers, 247 were female; 1 was male; and 2 did not respond to the question.

There were 68 teachers who had zero to five years of teaching experience; 77 had five to 10 years of experience; 39 had 10 to 15 years of experience; 23 had 15 to 20 years of experience; and 43 had over 20 years of teaching experience.

There were 35 participants who did not indicate their undergraduate major. Elementary education was the undergraduate major given by 196 of the teachers and 19 gave another discipline as their major. Only 67 teachers indicated an area of concentration and 28 of these gave two or more areas. Only three teachers indicated that mathematics had been their only area of concentration and mathematics along with one or more other areas was the response given by 15 teachers. Only reading (24) and social studies (20) were listed more often than mathematics.

Participants were asked to indicate the number of mathematics courses that they had taken during the last five years. There were 233 teachers who responded to the question. Their responses were as follows: no course--81, 1 course--57, 2 courses--42, 3 courses--32, 4 courses--16, 5 courses--4, and more than 5 courses--1.

Of the 245 teachers responding to the question regarding the subjects taught, 216 indicated that they taught all of the subjects

for one grade. One person taught mathematics only; 2 people taught mathematics and science; 4 taught reading and mathematics; and one taught social studies and mathematics. There were 21 teachers who taught all subjects except one or more of the following: art, music, physical education, science, social studies, health, reading, and English. Ten participants indicated that their teaching assignment was part of a special program. Of these 10, six were Title I teachers and four were teachers in other supplemental programs.

In response to the question regarding the degree, four participants indicated that they hold the educational specialist degree; 75 the master's degree; and 162 a bachelor's degree. Of the 226 participants indicating the date of their degree, 99 received a degree in 1973 or later and 127 received their degree prior to 1973.

Participants were asked to indicate the amount of time spent teaching mathematics each day and time of day when mathematics was usually taught. Twenty-seven teachers indicated that mathematics was taught at varying times during the day. Other responses were as follows:

Amount of time spent on mathematics each day:

| | |
|---|---|
| 4--up to 20 minutes | 81--30 to 40 minutes |
| 23--20 to 30 minutes | 137--over 40 minutes |

Time of day when mathematics is usually taught:

| | |
|---|---|
| 55--early morning | 131--early afternoon |
| 65--late morning | 15--late afternoon |

In response to the question "To what extent is your school involved in placing special emphasis on teaching and testing for basic skills?" twenty-three participants stated that no action had been taken. Seven indicated that they were "thinking about doing something"

and 46 checked the response "we are in the process of examining our curriculum and developing appropriate tests and instructional materials." "We have implemented a basic skills program" was the response checked by 148 teachers.

Language arts, mathematics, science, and social science are the areas generally taught by elementary teachers. The participants in this study were asked to rank those four areas from 4--"most enjoyable for me to teach" down to 1--"least enjoyable for me to teach." The question was not answered by 11 teachers and 17 did not rank all areas. Many teachers did not use all four numerals in their ranking of the areas and 54 ranked every area 3 and/or 4. Table 2 contains a summary of the responses.

The teachers were asked to rank the same four areas from 4--"I feel most competent to teach in this area" down to 1--"I feel least competent to teach in this area." There was no response from 16 teachers and 14 ranked only some of the areas. Of those who did respond, 60 ranked all areas 3 and/or 4. Table 3 contains a summary of the responses.

Each participant was asked to place an "X" on a scale from 1 to 11 to indicate their feeling toward mathematics. The scale ranged from 1--extreme dislike to 11--extreme like. The responses of the 227 teachers who responded ranged from 3 to 11 with a mean of 8.83.

There were only three positive responses to the question "Are you a member of the Mississippi Council of Teachers of Mathematics?" and 235 negative responses. There were only three positive responses and 233 negative responses to the question regarding membership in the National Council of Teachers of Mathematics. Only one teacher was a member of both organizations.

Table 2

RANKING OF AREAS ACCORDING TO ENJOYMENT

| Area | Number of Responses | | | |
|---|---|---|---|---|
| Rank: | 4 | 3 | 2 | 1 |
| Language Arts | 157 | 45 | 12 | 11 |
| Mathematics | 104 | 111 | 16 | 8 |
| Science | 33 | 69 | 69 | 63 |
| Social Studies | 38 | 68 | 71 | 56 |
| Totals | 332 | 293 | 168 | 138 |

Table 3

RANKING OF AREAS ACCORDING TO COMPETENCE

| Area | Number of Responses | | | |
|---|---|---|---|---|
| Rank: | 4 | 3 | 2 | 1 |
| Language Arts | 144 | 54 | 11 | 10 |
| Mathematics | 97 | 109 | 14 | 8 |
| Science | 39 | 59 | 68 | 60 |
| Social Studies | 46 | 65 | 67 | 49 |
| Totals | 326 | 287 | 160 | 127 |

The section of the questionnaire regarding the use of calculators was included as an item of interest for this study. Calculators have become a readily available instrument in the past few years. In response to the first question concerning the use of calculators "Do you allow students to use a calculator in the classroom?" only 24 teachers said "yes" while 204 said "no." Responses to the other questions regarding the use of the calculator were dependent on the responses to the first question; however, many teachers answered the remaining questions regardless of their answer to the first question.

The remaining questions are repeated below. The first number after the question indicates "yes" responses, the second number "no" responses.

Do you teach the use of a calculator? 14--108

Is the calculator used for basic computation? 8--90

Is the calculator used for checking problems only? 14--80

Do you plan to use a calculator in your classroom in the future? 38--182

If yes: Will the calculator be used for basic computation? 15--68

Will the calculator be used for checking problems only? 34--56

The information obtained from the general questionnaire and general information about the school were used to separate the responses to the skills questionnaire into the units for comparison discussed earlier, i.e. teaching experience, school enrollment, etc. The responses of these groups are discussed for each topic covered in the skills questionnaire.

## Pre-Literacy Level--Skills

The pre-literacy level skills questionnaire contained 60 items and was in two sections. For the first 36 skills listed, teachers were to indicate the amount of emphasis placed on that skill. The second section, items 37 through 60, was a condensed version of the 36 skills. Teachers were to indicate the importance attached to the skills by responding to these items. In the discussion of the results of the questionnaires, the skills have been grouped according to topics. The responses to the questionnaire are presented in Appendix C.

There were 27 teachers of grades one through three who completed the basic literacy skills questionnaire rather than the pre-literacy skills questionnaire; therefore, their responses regarding basic mathematical skills were not included in the results reported in this study.

### Conservation Of Numerousness

The data for this section are found in Appendix C.

Conservation of numerousness is a Piagetian concept and seems to be related to a child's ability to understand the meaning of numbers. The items related to this concept are:

one-to-one matching

equality of given collections of concrete objects

inequality of given collections of concrete objects

Teachers seemed to agree that these skills should be emphasized and that they are important. Eighty-four percent or more responded 3 or 4 (some or great emphasis) to each of the three skills and in the related "importance items" 89 percent or more responded 3 or 4 (some

or great importance) to each one. There was more emphasis on and importance attached to equality than to inequality.

The responses of the groups of teachers were compared for these items. Responses of 1--"no emphasis" and 2--"little emphasis" were combined for computation due to the small number of each. The chi-square statistic was computed for emphasis and importance for each grouping and the results are given in Table 4. The table value for chi-square for 2 degrees of freedom and 0.05 confidence level is 5.991. All except one of the computed values was less than the table value.

The number of years of teaching experience, the amount of time spent teaching mathematics per day, the date of the teacher's degree, the school's basic skills program, and the enrollment of the school were not significant factors in the emphasis on or the importance attached to the conservation of numerousness skills. Using the grouping related to "recency of continuing education in mathematics," those who had taken one or more mathematics courses in the past five years indicated more "emphasis" on this area. There was no significant difference for "importance" of the area. In responding to "equality of given collections of concrete objects," approximately 17 percent of those who had not taken a course recently responded 1 or 2 whereas approximately 9 percent of those who had taken a course recently responded 2. "Inequality of given collections of concrete objects" received little or no emphasis according to 24 percent of those who had not taken a course recently while approximately 13 percent of those who had taken a course responded "little emphasis." There were no responses of 1 on either category by the teachers who had taken a course in the last five years.

Table 4

CONSERVATION OF NUMEROUSNESS

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 2.747 | 3.321 |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 6.546* | 2.238 |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 0.247 | 2.005 |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 2.061 | 0.807 |
| Teachers who teach in schools that have a basic skills program versus teachers who teach in schools that do not have a basic skills program | 4.215 | 2.157 |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 1.179 | 1.360 |

* $p < 0.05$

Counting

Skills numbered 4 through 8 and 40 through 44 are counting and ordering skills. At least 83 percent responded 3 or 4 in relation to emphasis for these skills and at least 95 percent responded 3 or 4 to importance of these skills. This indicates that elementary teachers feel that counting skills are important. Data for this topic are presented in Appendix C.

The chi-square statistic was computed for emphasis and for importance of counting and ordering skills for the six groups of teachers and is given in Table 5. The table value for chi-square for 2 degrees of freedom and 0.05 confidence level is 5.991.

There was no significant difference in the emphasis on or the importance attached to counting and ordering skills by teachers who had taken no mathematics courses in the last 5 years and by teachers who had taken one or more mathematics courses in the last 5 years.

Significant differences were found in the following categories.

1. Those teachers with more than 5 years of experience placed more emphasis on these skills and attached more importance to them.
2. Those teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on and attached more importance to counting skills.
3. Those teachers who received their degree prior to 1973 attached more importance to this set of skills.
4. Those teachers who teach in a school that has a basic skills program attached more importance to these skills.

Table 5

COUNTING

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 8.729* | 6.215* |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 0.051 | 0.585 |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 9.842* | 7.111* |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 1.110 | 10.485* |
| Teachers who teach in schools that have a basic skills programs versus teachers who teach in schools that do not have a basic skills program | 3.397 | 6.624* |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 0.871 | 12.377* |

*$p < 0.05$

5. Those teachers who teach in a school that has an enrollment of less than 500 attached more importance to counting skills.

Identification of Numerals

The ability to identify the digits 0 through 9 and a knowledge of place value is basic to any further work in mathematics. Skills 9 through 14 and 45 through 49 of the questionnaire are skills necessary for identifying numerals and understanding the structure of the Hindu-Arabic numeration system. Data for this topic are presented in Appendix C.

The responses indicated that most teachers place emphasis on "identification of the digits 0--9" (#9), "reading and writing numerals to 100" (#10), and "identification of units and tens in a given numeral" (#12) as more than 90 percent of the teachers responded 3 or 4 on each of those skills. "Reading and writing numerals to 100" received some or great emphasis by 90 percent of the teachers and was of some or great importance according to 98 percent of the teachers. About 60 percent of the respondents indicated that they place some or great emphasis on "reading and writing numerals to 1000" (#11). According to 93 percent of the responses, "place value to 100" (#46) was important; however, only 70 percent felt that "place value beyond 100" (#47) was important. "Recognition of concrete representations of halves, thirds, fourths" (#13) received some emphasis as 86 percent gave 3 or 4 as their response. Approximately 90 percent of the teachers indicated that this skill was important. To "selection of fractional parts of a whole (halves, thirds, fourths) and use of correct symbols"

(#14) approximately 75 percent responded 3 or 4. "Recognition of other fractions" (#49) was considered of little or no importance by 39 percent of the teachers and of great importance by only 27 percent.

The chi-square statistic was computed for emphasis and for importance of identification of numerals skills for the six groups of teachers and is given in Table 6.

Significant differences were found in the following categories.

1. Those teachers with more than 5 years of experience placed more emphasis on and attached more importance to identification of numerals skills.
2. Those teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on and attached more importance to these skills. The greatest difference occurred in response to "reading and writing numerals to 1000" (#11), "selection of fractional parts of a whole (halves, thirds, fourths) and use of correct symbols" (#14), and "recognition of other fractions" (#49). About 74 percent of the teachers who spent more than 40 minutes per day responded 3 or 4 to skill 11 compared to 47 percent of the other group. For skill 14, 84 percent responded 3 or 4 compared to 64 percent of the other group; and for skill 49, 98 percent of those who spent more than 40 minutes responded 3 or 4 compared to 49 percent of the other group.
3. Those teachers who received their degree prior to 1973 placed more emphasis on and attached more importance to these skills. The greatest difference

Table 6

IDENTIFICATION OF NUMERALS

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 19.817* | 14.973* |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 2.292 | 2.249 |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 26.738* | 92.039* |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 8.368* | 28.580* |
| Teachers who teach in schools that have a basic skills programs versus teachers who teach in schools that do not have a basic skills program | 0.866 | 3.202 |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 0.262 | 11.001* |

*$p < 0.05$

occurred for "reading and writing numerals to 1000" (#11) and "selection of fractional parts of a whole (halves, thirds, fourths) and use of correct symbols" (#14).

4. Those teachers who teach in a school that has an enrollment of 500 or more attached more importance to identification of numerals skills. Approximately 71 percent of the teachers from schools with an enrollment of 500 or more responded 3 or 4 to "recognition of other fractions" (#49) compared to 57 percent of the teachers from the smaller schools.

Operations With Numbers

The skills for this section are numbers 15 through 20 and 50 through 54. The data are presented in Appendix C.

Basic facts for addition and subtraction (#15-#16) were emphasized according to 98 percent of the teachers. Although basic multiplication facts (#17) were emphasized by 53 percent of the teachers, 32 percent indicated that they placed no emphasis on multiplication facts. Basic division facts (#18) were emphasized by 43 percent of the teachers; however, 43 percent indicated that they placed no emphasis on the division facts. Recognition of the symbols for addition, subtraction, multiplication, and division (#19) was emphasized according to 83 percent of the teachers, and solving simple story problems (#20) received some or great emphasis according to 94 percent of the teachers. Over 98 percent of the teachers indicated that addition and subtraction facts (#50-#51) were of some or great

importance; however only 66 percent indicated that multiplication facts (#52) were important and only 55 percent indicated that division facts (#53) were important. "Problem solving skills" (#54) were of some or great importance according to 91 percent of the teachers.

The chi-square statistic was computed for emphasis and for importance of operations with numbers skills for the six groups of teachers and is given in Table 7.

Significant differences were found in the following categories.

1. Those teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on and attached more importance to operations with numbers skills. Approximately 79 percent of this group responded 3 or 4 to questions regarding multiplication and division skills compared to approximately 50 percent of the other group of teachers.
2. Those teachers who received their degree prior to 1973 placed more emphasis on and attached more importance to operations with numbers skills. These teachers placed more emphasis on and attached more importance to multiplication and division skills.
3. Those teachers who teach in a school that has a basic skills program placed more emphasis on operations with numbers skills.

Measurement Without Number

The data for this topic are presented in Appendix C.

Table 7

OPERATIONS WITH NUMBERS

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 0.274 | 2.239 |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 0.546 | 0.023 |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 13.473* | 25.364* |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 12.082* | 8.681* |
| Teachers who teach in schools that have a basic skills programs versus teachers who teach in schools that do not have a basic skills program | 8.497* | 4.636 |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 4.001 | 0.571 |

*$p < 0.05$

Skills in this category, numbers 21 through 27 and 55, were geometric skills such as recognition of plane and sold figures, seriation and classification skills. Teachers were in agreement regarding emphasis on "recognition of geometric shapes (circle, triangle, square)" (#21) as 90 percent responded 3 or 4; however, only 54 percent indicated that they placed emphasis on "recognition of solids (cubes, spheres, cylinders)" (#22). "Ordering objects according to size (smallest to largest)" (#24) was emphasized more than the other seriation skills with 91 percent of the teachers responding 3 or 4. "Ordering objects according to length (shortest to longest)" (#23) received some or great emphasis according to 88 percent of the teachers and "ordering objects according to weight (lightest to heaviest)" (#25) was emphasized according to the responses of 68 percent of the teachers. Although 92 percent indicated that they placed emphasis on "classification of coins according to value" (#26), only 73 percent emphasized reading and writing money values using the digits 0 through 9 (#27a) and only 69 percent emphasized reading and writing money values using words (#27b).

There was only one item in the importance section of the questionnaire for the topic measurement without number. "Geometry concepts" (#55) were of some or great importance according to 68 percent of the teachers.

The chi-sqaure statistic was computed for emphasis and for importance of measurement without number skills for the six groups of responses and the results are given in Table 8.

Table 8

MEASUREMENT WITHOUT NUMBER

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 3.868 | 7.687* |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 18.837* | 1.306 |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 10.922* | 9.418 |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 29.913* | 1.922 |
| Teachers who teach in schools that have a basic skills programs versus teachers who teach in schools that do not have a basic skills program | 5.580 | 2.192 |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 0.151 | 2.511 |

*$p < 0.05$

Significant differences were found in the following categories.

1. Those teachers with more than 5 years of experience attached more importance to measurement without number skills.
2. Those teachers who had taken 1 or more mathematics courses in the last 5 years placed more emphasis on this set of skills. The greatest difference occurred in response to "recognition of solids (cubes, spheres, cylinders)" (#22) and "reading and writing money values to $10.00 using written words" (#27b).
3. Those teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on measurement without number skills. The greatest difference occurred in response to "recognition of solids . . ." (#22) and "reading and writing money values to $10.00 using digits 0--9" (#27a).
4. Those teachers who received their degree prior to 1973 placed more emphasis on measurement without number skills with the major difference occurring in response to the skill regarding the use of written words to express money values.

Measurement With Number

This category contained skills essential for both direct and indirect measurement. The skills for this section are numbers 28 through 36 and 56 through 60. Data for this topic are presented in Appendix C.

The teachers placed more emphasis on measurement of length using an inch as the unit than measurement using a centimeter as the unit (#28-#29). Measurement of weight was not emphasized as much or considered as important as measurement of length (#s 28, 29, 30, 56, and 57). Although 50 percent of the teachers attached some importance to measurement of area (#58), only 29 percent emphasized finding area by making a comparison (#31) and only 22 percent by using a formula (#32). Measurement of volume received very little emphasis (#33-#34); however, 47 percent of the teachers attached some importance to measurement of volume (#59). Teachers placed little emphasis on the parts of a circle (#35); however, 66 percent placed some emphasis on "telling time to the quarter hour" (#36) and 98 percent attached importance to telling time (#60).

The chi-square statistic was computed for emphasis and for importance of measurement with number skills for the six groups of teachers and results are given in Table 9.

Significant differences were found in the following categories.

1. Those teachers with more than 5 years of experience placed more emphasis on and attached more importance to measurement with number skills. The greatest differences were in response to skills involving weight, area, volume, and the parts of a circle. These teachers also placed more emphasis on measurement using centimeters than the less experienced teachers.
2. Those teachers taking a mathematics course in the last 5 years placed more emphasis on this set of skills.

Table 9

MEASUREMENT WITH NUMBER

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 40.410* | 15.769* |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 6.656* | 4.166 |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 27.001* | 11.772* |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 26.802* | 16.102* |
| Teachers who teach in schools that have a basic skills programs versus teachers who teach in schools that do not have a basic skills program | 18.747* | 1.639 |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 5.771 | 0.847 |

*$p < 0.05$

3. Those teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on and attached more importance to measurement with number skills with the greatest difference occurring in regard to telling time to the quarter hour (#36).
4. Those teachers who received their degree prior to 1973 placed more emphasis on and attached more importance to measurement with number skills. The greatest differences occurred in response to "finding the volume of rectangular solids using formulae" (#34), "identification of parts of a circle (radius, diameter)" (#35), and "telling time to the quarter hour" (#36).
5. Those teachers who taught in a school having a basic skills program placed more emphasis on area, volume, measurement using centimeters, and identification of the parts of a circle. Those teachers from schools without a basic skills program placed more emphasis on measurement using inches and telling time to the quarter hour.

## Basic Literacy Level--General

The basic literacy level questionnaire was designed for teachers of grades four through six. The data obtained from this questionnaire are reported below according to the categories established by the set of questions (and hypotheses) developed in Chapter I.

There were 140 teachers of grades four through six who completed the general questionnaire. Of the 140 teachers, 19 were male and 121 were female.

All except one teacher indicated the number of years of teaching experience. The following responses were given: 45 had zero to five years; 29 had five to 10 years; 22 had 10 to 15 years; 15 had 15 to 20 years; and 28 had over 20 years.

There were 23 participants who did not specify their undergraduate major. Elementary education was the major given by 102 teachers and 15 gave another discipline as their major. Only 51 teachers specified an area of concentration and 25 of these listed two or more areas. Only four teachers indicated that mathematics had been their only area of concentration. Mathematics and one or more other areas were the response of 14 teachers.

Participants were asked to indicate the number of mathematics courses that they had taken in the last five years. A summary of the responses of the 135 teachers who specified a number shows that 35 teachers took no course; 33 took one course; 31 took two courses; 16 took three courses; 13 took four courses; two took five courses; and five took more than five courses.

"All subjects for one grade" was the most popular choice regarding the subjects taught with 75 teachers indicating that response. "Mathematics only" was the response of 21 teachers and six teachers responded "mathematics and science." There were 20 teachers who taught all subjects except one or more of the following: English, science, social studies, health, spelling, reading, art, physcial education, music, and language. For the 16 teachers who responded "other" for

their teaching assignment, the subjects specified were mathematics and one or more of the following: home economics, reading, industrial arts, or English. Eight of the participants indicated that their teaching assignment was part of a special program. Three were Title I teachers; three taught in a remedial program; one was a special education teacher; and one taught in a learning disabilities program.

In response to the question regarding their degree, two participants indicated that they hold the educational specialist degree; 51 indicated a master's degree; and 78 a bachelor's degree. Of the 123 who gave the date of their degree, 57 received their most recent degree prior to 1973 and 66 received theirs in 1973 or later.

Participants were asked to specify the amount of time spent on mathematics each day. No one spent less than 20 minutes teaching mathematics each day. Other responses were as follows: 20 to 30 minutes--1; 30 to 40 minutes--20; over 40 minutes--117; early morning--53; late morning--55; early afternoon--16; and late afternoon--4. Thirty-four teachers indicated that they taught mathematics at varying times.

In response to the question "To what extent is your school involved in placing special emphasis on teaching and testing for basic skills?" eight teachers responded that no action had been taken. Eight indicated that they were "thinking about doing something" and 21 checked the response "we are in the process of examining our curriculum and developing appropriate tests and instructional materials." "We have implemented a basic skills program" was the response checked by 80 teachers.

The teachers were asked to rank language arts, mathematics, science, and social studies from 4--"most enjoyable for me to teach" down to 1--"least enjoyable for me to teach." Six teachers did not rank any of the areas and 12 did not rank all areas. Many teachers did not use all four numerals in their ranking and 28 ranked every area 3 and/or 4. Table 10 contains a summary of the responses.

Participants were asked to rank the same four areas from 4--"I feel most competent to teach in this area" down to 1--"I feel least competent to teach in this area." Fourteen teachers did not rank any of the areas and nine ranked only some of the areas. Each areas was ranked 3 and/or 4 by 22 teachers. A summary of the responses is given in Table 11.

Each teacher was asked to place an "X" on a scale to indicate their feeling toward mathematics. The scale ranged from 1--"extreme dislike" to 11--"extreme like." The responses of 129 teachers ranged from approximately 2.2 to 11 with a mean of 9.21.

Only six teachers from this group indicated that they were members of the Mississippi Council of Teachers of Mathematics; 130 indicated that they were not members. There were 5 teachers who responded "yes" regarding membership in the National Council of Teachers of Mathematics and 129 who responded "no." Only three teachers were members of both organizations.

The last section of questions on the general questionnaire was questions concerning the use of a calculator in the classroom. In response to the first question "Do you allow students to use a calculator in the classroom?" 32 teachers said "yes" and 105 said "no." Responses to the other questions were dependent on the response to the

Table 10

RANKING OF AREAS ACCORDING TO ENJOYMENT

| Area | Number of Responses | | | |
|---|---|---|---|---|
| Rank: | 4 | 3 | 2 | 1 |
| Language Arts | 49 | 42 | 19 | 14 |
| Mathematics | 80 | 32 | 11 | 10 |
| Science | 23 | 46 | 22 | 35 |
| Social Studies | 36 | 33 | 39 | 19 |
| Totals | 188 | 153 | 91 | 78 |

Table 11

RANKING OF AREAS ACCORDING TO COMPETENCE

| Area | Number of Responses | | | |
|---|---|---|---|---|
| Rank: | 4 | 3 | 2 | 1 |
| Language Arts | 51 | 35 | 22 | 10 |
| Mathematics | 65 | 32 | 15 | 10 |
| Science | 19 | 41 | 25 | 35 |
| Social Studies | 35 | 37 | 31 | 17 |
| Totals | 170 | 145 | 93 | 72 |

first question; however, many teachers answered the remaining questions regardless of their answer to the first question.

The remaining questions are repeated below. The first number after the question indicates "yes" responses, the second number "no" responses.

Do you teach the use of a calculator? 18--59

Is the calculator used for basic computation? 7--61

Is the calculator used for checking problems only? 26--44

Do you plan to use a calculator in your classroom in the future? 42--80

If yes: Will the calculator be used for basic computation? 11--42

Will the calculator be used for checking problems only? 41--22

The information obtained from the general questionnaire and general information about the school were used to separate the responses to the skills questionnaire into the units for comparison discussed earlier, i.e., teaching experience, enrollment, etc. The responses of these groups are discussed for each topic of the basic skills questionnaire. The pre-literacy level skills contained two topics that were not part of the basic skills questionnaire--consersation of numerousness and counting.

## Basic Literacy Level--Skills

The basic literacy level skills questionnaire contained 59 items and was in two sections. For the first 38 skills listed, teachers were to indicate the amount of emphasis that they placed on that skill. The second section, items 39 through 59, was a condensed version of the 38 skills and teachers were to indicate the importance

attached to the skills by responding to each item in this section. In the presentation of the results, the skills have been grouped according to topics. The data obtained from the skills questionnaires are presented in Appendix D.

Identification Of Numerals

Skills 1 through 6 and 39 through 42 are skills involving the identification of numerals. Data for this topic are presented in Appendix D.

Approximately 85 percent of the teachers emphasized "reading and writing numerals to 1000" (#1), and 81 percent emphasized "reading and writing numerals to 1,000,000" (#2). Some importance was attached to "place value to thousands place" (#39) by 89 percent of the teachers and to "place value beyond thousands place" (#40) by 87 percent of the teachers.

Although 121 to 127 teachers gave responses to the other items for this topic, only 113 responded to "reading and writing money values to $1000.00 using written words" (#3b); however, 79 percent of those responding placed some or great emphasis on that skill. Eighty-five percent indicated that they placed some or great emphasis on "reading and writing money values to $1000.00 using digits 0--9" (#3a).

"Selection of fractional parts of a whole (halves, thirds, fourths) and use of correct symbols" (#4) received some or great emphasis according to 92 percent of the teachers. "Reading and writing numerals in fraction and mixed number notation" (#5) was emphasized by 87 percent of the teachers and was of some or great

importance (#42) according to 85 percent. Only 68 percent responded 3 or 4 to "reading and writing decimal numerals to thousandths" (#6); however, 74 percent responded 3 or 4 to number 41 indicating that approximately three-fourths of the teachers attached some importance to "reading numerals in decimal notation."

The responses of the groups of teachers previously mentioned were compared for items 1 through 6 and 39 through 42. Responses of 1 or 2 were combined for computation due to the small number of each. The chi-square statistic was computed for emphasis and for importance and the results are given in Table 12. The table value for chi-square for 2 degrees of freedom and 0.05 confidence level is 5.991.

Significant differences were found in the following categories.

1. There was a significant difference between the responses of teachers with more than 5 years of experience and those with less than 5 years of experience. The more experienced teachers placed less emphasis on "reading and writing numerals to 1000" (#1), but attached more importance to "place value to thousands place" (#39) than teachers with less experience. The more experienced teachers placed more emphasis on "reading and writing numerals to 1,000,000" (#2) and "reading and writing money values to $1000.00" (#3) and attached more importance to "place value beyond thousands place" (#40) than the other teachers. The less experienced teachers placed more emphasis on "selection of fractional parts of a whole (halves, thirds, fourths) and use of correct symbols" (#4), "reading and writing

Table 12

IDENTIFICATION OF NUMERALS

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 8.941* | 9.351* |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 10.866* | 3.991 |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 5.134 | 0.126 |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 6.235* | 5.157 |
| Teachers who teach in schools that have a basic skills program versus teachers who teach in schools that do not have a basic skills program | 5.264 | 3.734 |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 3.217 | 0.634 |

*$p < 0.05$

numerals in fraction and mixed number notation" (#5), and "reading and writing decimal numerals to thousandths" (#6), and attached more importance to "reading numerals in decimal notation" (#41) and "reading and writing numerals in fraction and mixed numeral notation" (#42) than the more experienced teachers.

One-third of the more experienced teachers indicated that they placed little or no emphasis on "reading and writing decimal numerals to thousandths" (#6), and 28 percent of this group attached little or no importance to "reading numerals in decimal notation" (#41).

2. Those teachers who had taken a mathematics course in the last 5 years placed more emphasis on skills for this topic with the greatest difference occurring in response to "reading and writing decimal numerals to thousandths" (#6).
3. Those teachers who received their degree in 1973 or later placed more emphasis on "reading and writing decimal numerals to thousandths" (#6) than teachers who received their degree prior to 1973.

Operations With Numbers

Skills numbered 7 through 22 and 43 through 53 are related to this category. Data for this topic are presented in Appendix D.

There was much variation in the responses to "changing a decimal to a common fraction and conversely" (#7) with 23 percent responding 1, 16 percent responding 2, 32 percent responding 3, and 29 percent responding 4. Teachers seemed to be in agreement regarding emphasis placed on the following:

8. Relationships between numbers ($<,=,>$) and use of correct notation to show relationship
9. All basic operations ($+,-,\times,\div$) using zero
10. Addition (addends less than 1000)
11. Subtraction (numbers less than 1000)
12. Basic multiplication facts
13. Multiplication (2 digit multiplier)
14. Basic division facts
15. Division (2 digit divisor)

More than 90 percent responded 3 or 4 to each skill of 8 through 14 and 88 percent responded 3 or 4 to skill 15. Approximately 92 percent of the teachers responded 4 to skill 9. Over 90 percent of the teachers responded 3 or 4 to "basic facts for 0--9 for all operations" (#43), "addition of 3 or more 3-digit numbers" (#44), and "subtraction involving renaming" (#45). Only 83 percent responded 3 or 4 to "understanding the multiplication algorithm" (#46) and "understanding the division algorithm" (#47). It seems that teachers attached more importance to addition and subtraction computation than to understanding the multiplication and division algorithms.

Although 83 percent responded 3 or 4 to "addition and subtraction of fractions" (#48), only 81 percent responded 3 or 4 to "addition and subtraction of fractions using halves, thirds, and fourths" (#16) and only 74 percent responded 3 or 4 to "addition and subtraction using

other fractions" (#17). Approximately 70 percent responded 3 or 4 to "multiplication and division of fractions" (#18); however, 80 percent responded 3 or 4 to "multiplication of fractions" (#49) and 77 percent responded 3 or 4 to "division of fractions" (#50). Approximately 20 percent indicated that they placed no emphasis on multiplication and division of fractions (#18); 11 percent attached no importance to multiplication of fractions (#49); and 15 percent attached no importance to division of fractions (#50).

A slightly higher percentage (56 to 60 percent) of the teachers responded 3 or 4 to importance of each skill (51a, 51b, 51c) involved in solving the three types of percent problems than responded 3 or 4 (50 to 58 percent) to emphasis on those skills (19a, 19b, 19c). Approximately one-fourth of the teachers indicated that they attached no importance to those skills and slightly over one-fourth indicated that they placed no emphasis on those skills.

Responses indicate that teachers placed more emphasis on solving word problems involving only one operation (#20) than problems involving more than one operation (#21). Approximately 90 percent responded 3 or 4 to importance of "problem solving skills" (#53).

For "solving problems involving ratio and proportion" (#22), only 46 percent responded 3 or 4 and 26 percent responded 1. One-fourth of the teachers responded 1 indicating that they attached no importance to "ratio and proportion" (#52); however, 52 percent responded 3 or 4.

The responses of the six groups of teachers were compared for operations with numbers skills. The chi-square statistic was computed for emphasis and importance and is given in Table 13.

Table 13

OPERATIONS WITH NUMBERS

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 25.540* | 26.770* |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 18.344* | 18.028* |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 9.005* | 5.645 |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 23.037* | 17.595* |
| Teachers who teach in schools that have a basic skills programs versus teachers who teach in schools that do not have a basic skills program | 16.526* | 10.495* |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 11.607* | 27.110* |

*$p < 0.05$

Significant differences were found in the following categories.

1. Teachers with more than 5 years of experience placed more emphasis on and attached more importance to all skills for this topic than the teachers with less experience.
2. There was significant difference in the emphasis placed on and the importance attached to skills in this category by teachers who had taken a mathematics course in the last 5 years and teachers who had not taken a course. Teachers who have not taken a mathematics course seemed to have stronger opinions on the skills in this area. A higher percentage of teachers who had taken no course responded 4 and a higher percentage of the same group responded 1.
3. Teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on most skills in this area. These teachers placed great emphasis on skills involving percent. A higher percentage of those who teach 40 minutes or less indicated "great emphasis" on ratio and proportion.
4. There was a significant difference in the emphasis placed on and the importance attached to skills in this category by teachers who received their degree prior to 1973 and teachers who received their degree in 1973 or later. Teachers who received their degree prior to 1973 seemed to have stronger opinions on the skills in this area as a higher percentage of this

group responded 4 and also a higher percentage responded 1.

5. A higher percentage of teachers teaching in a school without a "basic skills" program placed "great emphasis" and "great importance" on most of the skills in this area. Over one-third of the teachers in schools with a "basic skills" program indicated "no emphasis" on the skills involving percent.
6. Teachers in schools with less than 500 students placed greater emphasis on and attached more importance to the skills in this area.

Measurement Without Number

Measurement without number skills include recognition of plane and solid geometric figures, classification of angles, and identification of the parts of circles and plane figures. Skills 23 through 26 and 54 are this type of geometric skills. Data for this category are presented in Appendix D.

According to the responses, 50 percent or more of the teachers indicated that they placed some emphasis on each of the measurement without number skills. "Recognition of triangle, circle, square, and rectangle" (#23) was the only skill in this section where more than 50 percent of the teachers responded 4. Sixty percent responded 4; 28 percent responded 3; 9 percent responded 2; and 3 percent responded 1. Only 30 percent responded 4 to "recognition of solids (rectangular solids, cubes, spheres, cylinders)" (#24); however, 40 percent responded 3. Only 23 percent responded 4 to "classification of angles

as acute, obtuse, or right" (#25). Only 17 percent responded 4 to "identification of parts of circles and plane figures (radius, diameter, sides, angles)" (#26). Almost half of the teachers responded 3 for importance of geometry concepts (#54) and almost a fourth responded 4.

The responses of the six groups of teachers were compared for skills 23 through 26 and 54. The chi-square statistic was computed for emphasis and for importance and the results are given in Table 14.

Significant differences were found in the following categories.

1. Those teachers with more than 5 years of teaching experience attached more importance to measurement without number skills.
2. Those teachers who received a degree prior to 1973 placed more emphasis on and attached more importance to the skills in this area.
3. Those teachers in schools that do not have a basic skills program placed more emphasis on the measurement without number skills.

Measurement With Number

The skills for this category are numbered 27 through 38 and 55 through 59. Data for this category are presented in Appendix D.

The skills for this topic received less emphasis and were not considered as important as the skills for the other three topics. The following skills received little or no emphasis according to over 50 percent of the teachers.

30. Finding area of given figures using formulae
31. Finding volume of given figures using formulae

Table 14

MEASUREMENT WITHOUT NUMBER

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 4.083 | 11.634* |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 3.407 | 3.453 |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 0.097 | 0.169 |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 9.276* | 15.686* |
| Teachers who teach in schools that have a basic skills programs versus teachers who teach in schools that do not have a basic skills program | 8.197* | 1.074 |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 4.926 | 4.252 |

*$p < 0.05$

32. Measuring angles using a protractor

37. Organization of data (frequency, majority, etc.)

38. Interpretation of basic statistical data (average, range, odds)

Only 25 percent responded 4 to "use of standard measuring instruments for metric system" (#27); however, 44 percent responded 4 to "use of standard measuring instruments for English system" (#28). Approximately 42 percent responded 3 for each of those skills. In response to to measurement in the English system (#55a), 57 percent responded 4 compared to 38 percent who responded 4 to measurement in the metric system (#55b).

Although 74 percent responded 3 or 4 to importance of measuring perimeter (#55c), only 51 percent responded 3 or 4 to "finding perimeter of given figures using formulae" (#29). Measurement of area (#55d) was of some importance according to 70 percent of the teachers, however, only 48 percent indicated that they placed some emphasis on finding area (#30). Measurement of volume (#55e) was of some importance according to 68 percent, but only 38 percent responded 3 or 4 for emphasis on finding volume (#31).

"Measuring angles using a protractor" (#32) received little or no emphasis according to 59 percent of the teachers with only 12 percent responding 4. Although 86 percent responded 3 or 4 for importance of "time concepts including the calendar" (#56), only 74 percent responded 3 or 4 for emphasis of this skill (#33).

Approximately 82 percent responded 3 or 4 for importance of tables and graphs (#57). Seventy-seven percent responded 3 or 4 to "reading and interpreting graphs (bar, line, picture, circle)" (#35) and 73 percent responded 3 or 4 to "reading and interpreting tables" (#34).

"Map reading skills" (#58) were of some importance to 80 percent of the teachers; however, only 68 percent indicated that they placed some emphasis on skills (#36). Although 52 percent responded 3 or 4 to the importance of "statistics" (#59), only 36 percent responded 3 or 4 to "organization of data (frequency, majority, etc.)" (#37) and only 38 percent responded 3 or 4 to "interpretation of basic statistical data (average, range, odds)" (#38).

The responses of the six groups of teachers were compared for measurement with number skills. The chi-square statistic as computed for emphasis and for importance and the results are given in Table 15.

Significant differences were found in the following categories.

1. Teachers with more than 5 years experience placed more emphasis on and attached more importance to measurement with number skills than teachers with less experience with the following exception.

   Teachers with less than 5 years of experience placed more emphasis on measurement using instruments (both metric and English) and more importance on the English and metric systems.

2. Teachers who had taken a mathematics course in the last 5 years attached more importance to measurement with number skills than teachers who had taken no course.

3. Teachers who spent more than 40 minutes per day teaching mathematics attached more importance to measurement with number skills.

Table 15

MEASUREMENT WITH NUMBER

| Groups Compared | Emphasis Chi-Square | Importance Chi-Square |
|---|---|---|
| Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience | 11.033* | 17.487* |
| Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years | 1.124 | 26.331* |
| Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics | 1.467 | 7.657* |
| Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later | 23.872* | 3.040 |
| Teachers who teach in schools that have a basic skills program versus teachers who teach in schools that do not have a basic skills program | 12.051* | 25.549* |
| Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more | 11.347* | 25.050* |

*$p < 0.05$

4. Teachers who received their degree prior to 1973 placed more emphasis on measurement with number skills.
5. Teachers who taught in schools that do not have a basic skills program placed more emphasis on and attached more importance to most of the measurement with number skills.
6. Teachers from schools with an enrollment of less than 500 placed more emphasis on and attached more importance to measurement with number skills.

# CHAPTER V
# SUMMARY AND CONCLUSIONS

The purpose of this study was twofold: (1) to determine the emphasis placed on a set of basic mathematical skills by elementary school teachers in Mississippi public schools; and (2) to determine the importance attached to each of these basic skills by those teachers.

## Summary Of Procedures

The elementary school was used as the unit in the sample and 71 randomly selected elementary schools in Mississippi agreed to participate in the study. Forty-three of the schools selected returned a usable set of materials for the study. The participants in the study were the 390 teachers from these selected schools who were responsible for teaching mathematics. The principals were responsible for the distribution and return of the questionnaires and were also asked to complete a brief questionnaire regarding their school.

Each teacher completed a general questionnaire and a basic skills questionnaire. There were two forms of the basic skills questionnaire--one for teachers of grades one through three and one for teachers of grades four through six. Both forms of the skills questionnaires contained two sections. In the first section, teachers were asked to indicate the emphasis that they placed on a set of basic mathematical skills and, in the second section, teachers were asked to indicate the importance that they attached to these basic mathematical skills.

The data from the general questionnaire and general information about the school were used to place the responses to the skills questionnaire into appropriate units for comparison. Responses for the preliteracy and basic literacy level skills were placed in the following groups: $(G_x: x \in \{1, 2, \ldots, 14\})$.

$G_1$: Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience.

$G_2$: Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years.

$G_3$: Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics.

$G_4$: Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later.

$G_5$: Teachers who teach in schools that have a basic skills program versus teachers who teach in schools that do not have a basic skills program.

$G_6$: Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more.

$G_7$: Teachers who have a concentration in mathematics versus teachers who do not have a concentration in mathematics.

$G_8$: Teachers who teach mathematics only versus teachers who teach mathematics and other subjects.

$G_9$: Teachers who teach mathematics during the morning versus teachers who teach mathematics during the afternoon.

$G_{10}$: Male teachers versus female teachers.

$G_{11}$: Teachers whose undergraduate major was elementary education versus teachers whose undergraduate major was not elementary education.

$G_{12}$: Teachers who rated mathematics as the subject "most enjoyable for me to teach" versus teachers who did not rate mathematics as the subject "most enjoyable for me to teach."

$G_{13}$: Teachers who rated mathematics as the subject "I feel most competent to teach" versus teachers who did not rate mathematics as the subject "I feel most competent to teach."

$G_{14}$: Teachers who rated their feeling toward mathematics as 5 or less versus teachers who rated their feeling toward mathematics as greater than 5.

A summary of the responses was prepared for $G_1$ through $G_6$ for both pre-literacy level and basic literacy level skills (Appendix C and Appendix D).

Groupings $G_7$ through $G_{14}$ were not tested.

$G_7$: There were only three teachers of grades one through three and four teachers of grades four through six who listed mathematics as their only area of concentration.

$G_8$: Only one teacher in the pre-literacy group and only 21 in the basic literacy group taught mathematics only.

$G_9$: Almost all teachers taught mathematics at more than one time during the day.

$G_{10}$: There was only one male teacher in the one through three group and only 19 in the four through six group.

$G_{11}$: Only 19 teachers in the pre-literacy group and only 15 in the basic literacy group indicated a major other than elementary education.

$G_{12}$: Data were not sufficient to compare these groups.

$G_{13}$: Data were not sufficient to compare these groups.

$G_{14}$: Only seven teachers of grades one through three and only two teachers of grades four through six rated their feelings toward mathematics as five or less.

The skills were grouped by topics.

Pre-Literacy--grades 1-3 $(P_x: x \in \{1, 2, \ldots, 6\})$

$P_1$: Conservation of numerousness

$P_2$: Counting

$P_3$: Identification of numerals

$P_4$: Operations with numbers

$P_5$: Measurement without number

$P_6$: Measurement with number

Basic Literacy--grades 4-6 $(B_x: x \in \{1, 2, 3, 4\})$

$B_1$: Identification of numerals

$B_2$: Operations with numbers

$B_3$: Measurement without number

$B_4$: Measurement with number

The hypotheses of the study were as follows:

$H_1$: There is no significant difference in the emphasis placed on $P_x$ by teachers of grades 1-3 in grouping $G_x$.

$H_2$: There is no significant difference in the importance attached to $P_x$ by teachers of grades 1-3 in grouping $G_x$.

$H_3$: There is no significant difference in the emphasis placed on $B_x$ by teachers of grades 4-6 in grouping $G_x$.

$H_4$: There is no significant difference in the importance attached to $B_x$ by teachers of grades 4-6 in grouping $G_x$.

## Findings

The results of the analysis of the data collected in this study are summarized below. The results are organized by considering the several groupings of teachers listed above and reporting the major findings for each grouping.

$G_1$: Teachers having 0 to 5 years of teaching experience versus teachers having more than 5 years of experience.

Pre-Literacy (1-3)

| | |
|---|---|
| Conservation of Numerousness | No significant difference. |
| Counting | Teachers with more than 5 years experience placed more emphasis on these skills and attached more importance to them. |
| Identification of Numerals | Teachers with more than 5 years experience placed more emphasis on and attached more importance to these skills. |
| Operations with Numbers | No significant difference. |
| Measurement without Number | Teachers with more than 5 years experience attached more importance to these skills. |
| Measurement with Number | Teachers with more than 5 years experience placed more emphasis on and attached more importance to these skills. |

Basic Literacy (4-6)

| | |
|---|---|
| Identification of Numerals | Teachers with 5 or less years experience placed more emphasis on and attached more importance to most of the skills in this area. |
| Operations with Number | Teachers with more than 5 years experience placed more emphasis on and attached more importance to these skills. |
| Measurement without Number | Teachers with more than 5 years experience attached more importance to these skills. |
| Measurement with Number | Teachers with more than 5 years experience placed more emphasis on and attached more importance to all measurement with number skills except these skills involving measurement using instruments (both metric and English). |

$G_2$: Teachers taking no mathematics course in the last 5 years versus teachers taking 1 or more mathematics courses in the last 5 years.

Pre-Literacy (1-3)

| | |
|---|---|
| Conservation of Numerousness | Teachers who had taken a mathematics course in the last 5 years placed more emphasis on skills in this area. |
| Counting | No significant difference. |
| Identification of Numerals | No significant difference. |
| Operations with Numbers | No significant difference. |
| Measurement without Number | Teachers who had taken a mathematics course in the last 5 years placed more emphasis on this set of skills. |
| Measurement with Number | Teachers who had taken a mathematics course in the last 5 years placed more emphasis on this set of skills. |

Basic Literacy (4-6)

| | |
|---|---|
| Identification of Numerals | Teachers who had taken a mathematics course in the last 5 years placed more emphasis on this set of skills. |
| Operations with Number | Teachers who had taken a mathematics course in the last 5 years placed more emphasis on and attached more importance to skills in this area. |
| Measurement without Number | No significant difference. |
| Measurement with Number | Teachers who had taken a mathematics course in the last 5 years attached more importance to this set of skills. |

$G_3$: Teachers who spent 40 minutes or less per day teaching mathematics versus teachers who spent more than 40 minutes per day teaching mathematics.

Pre-Literacy (1-3)

| | |
|---|---|
| Conservation of Numerousness | No significant difference. |
| Counting | Teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on and attached more importance to these skills. |
| Identification of Numerals | Teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on and attached more importance to these skills. |
| Operations with Numbers | Teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on and attached more importance to these skills. |
| Measurement without Number | Teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on these skills. |
| Measurement with Number | Teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on and attached more importance to these skills. |

Basic Literacy (4-6)

| | |
|---|---|
| Identification of Numerals | No significant difference. |
| Operations with Numbers | Teachers who spent more than 40 minutes per day teaching mathematics placed more emphasis on most skills in this area. |
| Measurement without Number | No significant difference. |
| Measurement with Number | Teachers who spent more than 40 minutes per day teaching mathematics attached more importance to these skills. |

$G_4$: Teachers who received their degree prior to 1973 versus teachers who received their degree in 1973 or later.

Pre-Literacy (1-3)

| | |
|---|---|
| Conservation of Numerousness | No significant difference. |
| Counting | Teachers who received their degree prior to 1973 attached more importance to these skills. |
| Identification of Numerals | Teachers who received their degree prior to 1973 placed more emphasis on and attached more importance to these skills. |
| Operations with Numbers | Teachers who received their degree prior to 1973 placed more emphasis on and attached more importance to these skills. |
| Measurement without Number | Teachers who received their degree prior to 1973 placed more emphasis on these skills. |
| Measurement with Number | Teachers who received their degree prior to 1973 placed more emphasis on and attached more importance to these skills. |

Basic Literacy (4-6)

| | |
|---|---|
| Identification of Numerals | Teachers who received their degree in 1973 or later placed more emphasis on these skills. |
| Operations with Numbers | Teachers who received their degree prior to 1973 seemed to have stronger opinions on the skills in this area. |
| Measurement without Number | Teachers who received their degree prior to 1973 placed more emphasis on and attached more importance to these skills. |
| Measurement with Number | Teachers who received their degree prior to 1973 placed more emphasis on these skills. |

$G_5$: Teachers who teach in schools that have a basic skills program versus teachers who teach in schools that do not have a basic skills program.

Pre-Literacy (1-3)

| | |
|---|---|
| Conservation of Numerousness | No significant difference. |
| Counting | Teachers who teach in a school that has a basic skills program attached more importance to these skills. |
| Identification of Numerals | No significant difference. |
| Operations with Numbers | Teachers who teach in a school that has a basic skills program placed more emphasis on these skills. |
| Measurement without Number | No significant difference. |
| Measurement with Number | Teachers who teach in a school that has a basic skills program placed more emphasis on area, volume, use of centimeters, and identification of the parts of a circle. Teachers who teach in a school without a basic skills program placed more emphasis on use of inches and telling time to quarter hour. |

Basic Literacy (4-6)

| | |
|---|---|
| Identification of Numerals | No significant difference. |
| Operations with Numbers | Teachers who teach in a school without a basic skills program placed more emphasis on the skills in this area. |
| Measurement without Number | Teachers who teach in a school without a basic skills program placed more emphasis on the skills in this area. |
| Measurement with Number | Teachers who teach in a school without a basic skills program placed more emphasis on and attached more importance to the skills in this area. |

$G_6$: Teachers who teach in schools having an enrollment of less than 500 versus teachers who teach in schools having an enrollment of 500 or more.

Pre-Literacy (1-3)

| | |
|---|---|
| Conservation Numerousness | No significant difference. |
| Counting | Teachers who teach in a school that has an enrollment of less than 500 attached more importance to these skills. |
| Identification of Numerals | Teachers who teach in a school that has an enrollment of 500 or more attached more importance to these skills. |
| Operations with Numbers | No significant difference. |
| Measurement without Number | No significant difference. |
| Measurement with Number | No significant difference. |

Basic Literacy (4-6)

| | |
|---|---|
| Identification of Numerals | No significant difference. |
| Operations with Numbers | Teachers who teach in a school that has an enrollment of less than 500 placed more emphasis on and attached more importance to these skills. |
| Measurement without Number | No significant difference. |
| Measurement with Number | Teachers who teach in a school that has an enrollment of less than 500 placed more emphasis on and attached more importance to these skills. |

## Conclusions And Implications

### Teaching Experience

Teacher experience was considered an important variable in the design of this study. Teachers in both grades one through three and four through six with more than 5 years of experience in general did place more emphasis on the skills and attach more importance to them. This would suggest that inexperienced teachers may be in need of carefully planned curriculum guides in mathematics especially in mathematical areas other than computation.

### Taking A Mathematics Course

Continued study in mathematics as evidenced by course work in this area was expected to play a part in teacher emphasis on the basic mathematical skills and the importance attached to them by these teachers. This grouping proved important particularly in the measurement and geometry areas in both the 1-3 and 4-6 groups. These are relatively slighted areas in elementary mathematics and continued education in mathematics may cause teachers to reconsider these areas in their teaching.

### Time

The amount of time spent on mathematics during the school day seemed an obvious factor in considering emphasis on and importance attached to basic mathematical skills. Those teachers spending more than 40 minutes per day in teaching mathematics place more emphasis on multiplication and division in grades one through three and on

measurement concepts, particularly solids, money values and telling time, in grades one through three. The teachers of grades four through six who spend more than 40 minutes per day on mathematics place more emphasis on percent concepts and measurement with numbers concepts. The time variable, as expected, seems to allow teachers to introduce concepts earlier and to place more emphasis on concepts other than the four basic operations.

There were 27 teachers in the 1-3 group that spent 30 minutes or less on mathematics each day. Perhaps schools should consider a uniform pattern of time allocation for the teaching of mathematics.

Date Of Degree

One expectation was that recency of degree would have some bearing on the emphasis placed on basic mathematical skills and the importance attached to these skills by teachers. Today's elementary school teacher training programs place more emphasis on geometry and measurement concepts and this difference might be detected in the results. In general, those teachers receiving degrees prior to 1973 placed more emphasis on and attached more importance to these skills than did those receiving degrees after 1973. The most recent graduates (grades 4-6) did place more emphasis on measurement using instruments in both the metric and English systems and attached more importance to the study of the English and metric systems. Current emphasis on the metric system in "methods" classes seems to show in classroom work.

Basic Skills Programs

The establishment of a "basic skills" program in a school was expected to be an important variable in the emphasis placed on basic mathematical skills and the importance attached to those skills by teachers. In the pre-literacy area (1-3), teachers from schools with basic skills programs attach more importance to counting skills and place more emphasis on the basic operations than teachers from schools that do not have a basic skills program. Those with a basic skills program place more emphasis on measuring using the centimeter as a unit and without a basic skills program teachers place more emphasis on measuring using the inch as a unit. (This may imply that, as schools develop such a program, the recent emphasis on metric measurement is now considered.)

In the basic skills area (4-6), those teachers from schools without a basic skills program place more emphasis on measurement without number (geometry concepts) and place more emphasis on and attach more importance to measurement with number than those from schools with a basic skills program. Those from schools without a basic skills program also place more emphasis on and attached more importance to percent concepts. The results from the basic literacy area suggest that basic skills programs are primarily computation programs, especially computation using the four basic operations. Schools developing such a program should insure that all facets of mathematics education are considered.

Enrollment

Size of school was thought to play a role in the emphasis on and importance attached to basic mathematical skills. This variable did not yield many major differences. No conclusions could be reached by considering this variable. The teachers from the smaller schools (less than 500 students) placed more emphasis on counting skills (1-3); placed more emphasis on and attached more importance to operations with numbers skills (4-6); and placed more emphasis on and attached more importance to measurement without number skills (4-6). Those teachers from larger schools attached more importance to identification of numerals skills.

The calculator has become a readily available tool in the past few years. The National Council of Teachers of Mathematics Instructional Affairs Committee (1976) made the following statement regarding the use of calculators in the classroom.

> With the decrease in cost of the minicalculator, its accessibility to students at all levels is increasing rapidly. Mathematics teachers should recognize the potential contribution of this calculator as a valuable instructional aid. In the classroom, the minicalculator should be used in imaginative ways to reinforce learning and to motivate the learner as he becomes proficient in mathematics. (p. 72)

Teachers in this study overwhelmingly reject the calculator as a teaching tool. Only 32 of 390 teachers indicated that they teach the use of the calculatotr. Several respondents not only checked "no" to questions regarding use of the calculator but also added remarks such as "2nd graders do not use calculators," "Never!," "Absolutely Not!", and "NO! NO! NO! NO! NO!

Use of the calculator is a controversial topic in mathematics education. The teachers in this study seem to have already drawn their own conclusions to the controversy; only 80 of the 390 teachers indicated that they plan to make use of the calculator sometime in the future. Some teachers did indicate that they would use them "if they had them." This could mean that classroom sets of calculators supplied by the school could result in an increased use of the instrument in the classroom. The immediate rejection of calculators implies that teachers do not know how to use them as a teaching tool and inservice programs would be necessary.

The teachers in this study are notable by their lack of participation in organizations related to mathematics education. Only 9 teachers belonged to the Mississippi Council of Teachers of Mathematics and 8 to the National Council of Teachers of Mathematics. The wealth of information available from such organizations would be very valuable for teachers. Perhaps if the schools or a particular teacher in a school became members of these (or other) organizations the information would become available to teachers in the schools.

The "percent" area in the basic literacy skills (4-6) was broken down into the socalled three cases of percent.

1. Finding the percent of a number
2. Finding a number when a percent of it is known
3. Finding what percent one number is of another

Teachers seem to place equal emphasis on and attach equal importance to all three cases. Many lists of basic skills place most emphasis on "finding the percent of a number." This is the major percent skill tested in the Florida eleventh grade testing program for example.

This is one example of an instance in which a carefully planned basic skills program could improve the teaching of basic skills.

Teachers of both pre-literacy and basic literacy levels seemed to place little or no emphasis and attach little or no importance to some of the skills in the measurement and geometry areas. At the pre-literacy level, those skills necessary for an understanding of the concept of measurement received little or no emphasis. A carefully planned basic skills program could improve teaching by placing appropriate emphasis on the skills in both of these areas.

## Future Research

Groupings $G_7$ through $G_{14}$ could not be tested from the data collected in this study. A sample of adequate size and stratified to insure the ability to test these groupings would be worth consideration for study.

The type of scale used in this study to determine the teacher's feeling toward teaching mathematics provided too little information. Use of an attitude test in a study of this type should provide more meaningful information than a number on a scale provided.

Since no conclusions could be reached by considering the enrollment of the schools, a comparison of the responses regarding basic skills of teachers who teach in rural schools and teachers who teach in urban schools might be worthwhile.

Many elementary school teachers are very dependent on their textbooks and tend to teach only material that is presented in the book with little or no use of supplementary materials. An analysis of

elementary school mathematics textbooks along with the teachers' responses to a basic mathematical skills questionnaire should be an interesting study.

A long term research project worth consideration would be to survey the students in teacher education programs regarding basic mathematical skills and then conduct a follow-up survey of these same people after they begin teaching to see if they change their position regarding basic mathematical skills.

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# APPENDIX A

# THE TEACHERS' QUESTIONNAIRES

A SURVEY OF THE BASIC MATHEMATICAL SKILLS IN ELEMENTARY SCHOOLS IN MISSISSIPPI

Male_____ Female_____

Grade or Grades Taught_____

Number of years of teaching experience: (check one)

_____ 0 to 5 _____ 15 to 20

_____ 5 to 10 _____ over 20

_____ 10 to 15

Undergraduate major _____

Area of concentration (if any) _____

Number of mathematics courses taken during last 5 years: (circle one)

0 1 2 3 4 5 more than 5

Check one: You teach 1) mathematics only, 2) mathematics and science, 3) all subjects for one grade, 4) all subjects except _____ for one grade, or 5) other _____ (please specify).

List degrees you hold and year each was received:

_____

_____

Amount of time spent on mathematics each day: (check one)

_____ up to 20 minutes _____ 30 to 40 minutes

_____ 20 to 30 minutes _____ over 40 minutes

Time of day when mathematics is usually taught: (check one)

_____ early morning _____ early afternoon

_____ late morning _____ late afternoon

If you teach in a special program such as Title I, please describe your program._____

To what extent is your school involved in placing special emphasis on teaching and testing for basic skills? (check one)

_____ No action has been taken on these ideas.

_____ We are thinking about doing something.

_____ We are in the process of examining our curriculum and developing appropriate tests and instructional materials.

_____ We have implemented a basic skills program.

In column (1) of the table below, write the numerals 4, 3, 2, 1. 4--"most enjoyable for me to teach" down to 1--"least enjoyable for me to teach."

In column (2) of the table below, write the numerals 4, 3, 2, 1. 4--"I feel most competent to teach in this area" down to 1--"I feel least competent to teach in this area."

| | (1) | (2) |
|---|---|---|
| Language Arts (Reading, Writing, Spelling, Grammar and Punctuation, Literature) | | |
| Mathematics | | |
| Science | | |
| Social Studies | | |

Place an "X" on the scale below to indicate your feeling toward mathematics.

Extreme Dislike ... Extreme Like

1 2 3 4 5 6 7 8 9 10 11

Are you a member of the Mississippi Council of Teachers of Mathematics?

_____yes _____no

Are you a member of the National Council of Teachers of Mathematics?

_____yes _____no

Do you allow students to use a calculator in the classroom?

_____yes _____no

If yes: Do you teach the use of a calculator? _____yes _____no

Is the calculator used for basic computation?

_____yes _____no

Is the calculator used for checking problems only?

_____yes _____no

If no: Do you plan to use a calculator in your classroom in the future? _____yes _____no

If yes: Will the calculator be used for basic computation?
_____yes _____no

Will the calculator be used for checking problems only?

_____yes _____no

TO: Elementary Mathematics Teachers of Grades 1 Through 3

SUBJECT: Basic Skills Survey

This is a survey regarding the teaching of basic skills in mathematics in public elementary schools in Mississippi. The purpose of this survey is to determine the importance you attach to the basic skills in mathematics and the emphasis you place on basic skills in your teaching.

Do not identify yourself on the questionnaire. Please answer the questions according to your opinion and your own teaching. Read each question and respond according to your immediate reaction. When you have completed all parts of the questionnaire, seal it in the envelope provided and return it to your principal.

Thank you for your assistance in obtaining a valid expression of teachers' opinions on a very important educational issue.

## PRE-LITERACY SKILLS

For each skill listed below, circle the numeral that most closely approximates the amount of emphasis that you place on that skill.
1--No emphasis; 2--Little emphasis; 3--Some emphasis; 4--Great emphasis.

| | | | | | |
|---|---|---|---|---|---|
| 1. | One-to-one matching | 1 | 2 | 3 | 4 |
| 2. | Equality of given collections of concrete objects (or pictorial representations) | 1 | 2 | 3 | 4 |
| 3. | Inequality of given collections of concrete objects (or pictorial representations) | 1 | 2 | 3 | 4 |
| 4. | Cardinality of a collection of concrete objects less than or equal to 20 | 1 | 2 | 3 | 4 |
| 5. | Adding 1 to a number (for all numbers less than 100) | 1 | 2 | 3 | 4 |
| 6. | Counting by 2's, 5's, and 10's to 100 | 1 | 2 | 3 | 4 |
| 7. | Ordering a given set of numbers (smallest to largest) | 1 | 2 | 3 | 4 |
| 8. | Use of correct notation, $<$, $=$, $>$, to show relationship between numbers | 1 | 2 | 3 | 4 |
| 9. | Identification of the digits 0--9 | 1 | 2 | 3 | 4 |
| 10. | Reading and writing numerals to 100 | 1 | 2 | 3 | 4 |
| 11. | Reading and writing numerals to 1000 | 1 | 2 | 3 | 4 |
| 12. | Identification of <u>units</u> and <u>tens</u> in a given numeral | 1 | 2 | 3 | 4 |
| 13. | Recognition of concrete representations of halves, thirds, fourths | 1 | 2 | 3 | 4 |
| 14. | Selection of fractional parts of a whole (halves, thirds, fourths) and use of correct symbols | 1 | 2 | 3 | 4 |
| 15. | Basic addition facts for numbers 1--9 | 1 | 2 | 3 | 4 |
| 16. | Basic subtraction facts for numbers 1--9 | 1 | 2 | 3 | 4 |
| 17. | Basic multiplication facts for numbers 1--9 | 1 | 2 | 3 | 4 |
| 18. | Basic division facts for numbers 1--9 | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| 19. | Recognition of the symbols +, -, X, ÷ | 1 | 2 | 3 | 4 |
| 20. | Solving simple story problems using concrete objects (or pictorial representations) | 1 | 2 | 3 | 4 |
| 21. | Recognition of geometric shapes (circle, triangle, square) | 1 | 2 | 3 | 4 |
| 22. | Recognition of solids (cubes, spheres, cylinders) | 1 | 2 | 3 | 4 |
| 23. | Ordering objects according to length (shortest to longest) | 1 | 2 | 3 | 4 |
| 24. | Ordering objects according to size (smallest to largest) | 1 | 2 | 3 | 4 |
| 25. | Ordering objects according to weight (lightest to heaviest) | 1 | 2 | 3 | 4 |
| 26. | Classification of coins according to value | 1 | 2 | 3 | 4 |
| 27. | Reading and writing money values to $10.00 | | | | |
| | a) using digits 0--9 | 1 | 2 | 3 | 4 |
| | b) using written words | 1 | 2 | 3 | 4 |
| 28. | Use of ruler to measure length to nearest inch | 1 | 2 | 3 | 4 |
| 29. | Use of ruler to measure length to nearest centimeter | 1 | 2 | 3 | 4 |
| 30. | Use of scales to measure weight | 1 | 2 | 3 | 4 |
| 31. | Covering a given region with "unit squares" and counting to find the area of the region | 1 | 2 | 3 | 4 |
| 32. | Finding the area of a square and a rectangle using formulae | 1 | 2 | 3 | 4 |
| 33. | Filling a given space with "unit cubes" and counting to find the volume of the space | 1 | 2 | 3 | 4 |
| 34. | Finding the volume of rectangular solids using formulae | 1 | 2 | 3 | 4 |
| 35. | Identification of parts of a circle (radius, diameter) | 1 | 2 | 3 | 4 |
| 36. | Telling time to the quarter hour | 1 | 2 | 3 | 4 |

For each skill listed below, circle the numeral that most closely approximates the importance that you attach to that skill. 1--No importance; 2--Little importance; 3--Some importance; 4--Great importance.

| | | | | | |
|---|---|---|---|---|---|
| 37. | One-to-one matching | 1 | 2 | 3 | 4 |
| 38. | Equality | 1 | 2 | 3 | 4 |
| 39. | Inequality | 1 | 2 | 3 | 4 |
| 40. | Counting by 1's | 1 | 2 | 3 | 4 |
| 41. | Counting by 2's | 1 | 2 | 3 | 4 |
| 42. | Counting by 5's | 1 | 2 | 3 | 4 |
| 43. | Counting by 10's | 1 | 2 | 3 | 4 |
| 44. | Ordering sets of numbers | 1 | 2 | 3 | 4 |
| 45. | Reading and writing numerals to 100 | 1 | 2 | 3 | 4 |
| 46. | Place value to 100 | 1 | 2 | 3 | 4 |
| 47. | Place value beyond 100 | 1 | 2 | 3 | 4 |
| 48. | Recognition of concrete representations (halves, thirds, fourths) | 1 | 2 | 3 | 4 |
| 49. | Recognition of other fractions | 1 | 2 | 3 | 4 |
| 50. | Basic addition facts | 1 | 2 | 3 | 4 |
| 51. | Basic subtraction facts | 1 | 2 | 3 | 4 |
| 52. | Basic multiplication facts | 1 | 2 | 3 | 4 |
| 53. | Basic division facts | 1 | 2 | 3 | 4 |
| 54. | Problem solving skills | 1 | 2 | 3 | 4 |
| 55. | Geometry concepts | 1 | 2 | 3 | 4 |
| 56. | Measurement of length | 1 | 2 | 3 | 4 |
| 57. | Measurement of weight | 1 | 2 | 3 | 4 |
| 58. | Measurement of area | 1 | 2 | 3 | 4 |
| 59. | Measurement of volume | 1 | 2 | 3 | 4 |
| 60. | Telling time | 1 | 2 | 3 | 4 |

TO: Elementary Mathematics Teachers of Grades 4 through 6

SUBJECT: Basic Skills Survey

This is a survey regarding the teaching of basic skills in mathematics in public elementary schools in Mississippi. The purpose of this survey is to determine the importance you attach to the basic skills in mathematics and the emphasis you place on basic skills in your teaching.

Do not identify yourself on the questionnaire. Please answer the questions according to your opinion and your own teaching. Read each question and respond according to your immediate reaction. When you have completed all parts of the questionnaire, seal it in the envelope provided and return it to your principal.

Thank you for your assistance in obtaining a valid expression of teachers' opinions on a very important educational issue.

# BASIC LITERACY SKILLS

For each skill listed below, circle the numeral that most closely approximates the amount of emphasis that you place on that skill.
1--No emphasis; 2--Little emphasis; 3--Some emphasis; 4--Great emphasis.

| | | | | | |
|---|---|---|---|---|---|
| 1. | Reading and writing numerals to 1000 | 1 | 2 | 3 | 4 |
| 2. | Reading and writing numerals to 1,000,000 | 1 | 2 | 3 | 4 |
| 3. | Reading and writing money values to $1000.00 | | | | |
| | a) using digits 0--9 | 1 | 2 | 3 | 4 |
| | b) using written words | 1 | 2 | 3 | 4 |
| 4. | Selection of fractional parts of a whole (halves, thirds, fourths) and use of correct symbols | 1 | 2 | 3 | 4 |
| 5. | Reading and writing numerals in fraction and mixed number notation | 1 | 2 | 3 | 4 |
| 6. | Reading and writing decimal numerals to thousandths | 1 | 2 | 3 | 4 |
| 7. | Changing a decimal to a common fraction and conversely | 1 | 2 | 3 | 4 |
| 8. | Relationships between numbers ($<$, $=$, $>$) and use of correct notation to show relationship | 1 | 2 | 3 | 4 |
| 9. | All basic operations ($+$, $-$, $\times$, $\div$) using zero | 1 | 2 | 3 | 4 |
| 10. | Addition (addends less than 1000) | 1 | 2 | 3 | 4 |
| 11. | Subtraction (numbers less than 1000) | 1 | 2 | 3 | 4 |
| 12. | Basic multiplication facts | 1 | 2 | 3 | 4 |
| 13. | Multiplication (2 digit multiplier) | 1 | 2 | 3 | 4 |
| 14. | Basic division facts | 1 | 2 | 3 | 4 |
| 15. | Division (2 digit divisor) | 1 | 2 | 3 | 4 |
| 16. | Addition and subtraction of fractions using halves, thirds and fourths | 1 | 2 | 3 | 4 |
| 17. | Addition and subtraction using other fractions | 1 | 2 | 3 | 4 |
| 18. | Multiplication and division of fractions | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| 19. | Solving percent problems | | | | |
| | a) Finding percent of a number | 1 | 2 | 3 | 4 |
| | b) Finding a number when a percent of it is known | 1 | 2 | 3 | 4 |
| | c) Finding what percent one number is of another | 1 | 2 | 3 | 4 |
| 20. | Solving simple story problems involving only one operation | 1 | 2 | 3 | 4 |
| 21. | Solving simple story problems involving more than one operation | 1 | 2 | 3 | 4 |
| 22. | Solving problems involving ratio and proportion | 1 | 2 | 3 | 4 |
| 23. | Recognition of triangle, circle, square, and rectangle | 1 | 2 | 3 | 4 |
| 24. | Recognition of solids (rectangular solids, cubes, spheres, cylinders) | 1 | 2 | 3 | 4 |
| 25. | Classification of angles as acute, obtuse, or right | 1 | 2 | 3 | 4 |
| 26. | Identification of parts of circles and plane figures (radius, diameter, sides, angles) | 1 | 2 | 3 | 4 |
| 27. | Use of standard measuring instruments for metric system | 1 | 2 | 3 | 4 |
| 28. | Use of standard measuring instruments for English system | 1 | 2 | 3 | 4 |
| 29. | Finding perimeter of given figures using formulae | 1 | 2 | 3 | 4 |
| 30. | Finding area of given figures using formulae | 1 | 2 | 3 | 4 |
| 31. | Finding volume of given figures using formulae | 1 | 2 | 3 | 4 |
| 32. | Measuring angles using a protractor | 1 | 2 | 3 | 4 |
| 33. | Time concepts including the calendar | 1 | 2 | 3 | 4 |
| 34. | Reading and interpreting tables | 1 | 2 | 3 | 4 |
| 35. | Reading and interpreting graphs (bar, line, picture, circle) | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| 36. | Map reading skills (location and distance) | 1 | 2 | 3 | 4 |
| 37. | Organization of data (frequency, majority, etc.) | 1 | 2 | 3 | 4 |
| 38. | Interpretation of basic statistical data (average, range, odds) | 1 | 2 | 3 | 4 |

For each skill listed below, circle the numeral that most closely approximates the importance that you attach to that skill. 1--No importance; 2--Little importance; 3--Some importance; 4--Great importance.

| | | | | | |
|---|---|---|---|---|---|
| 39. | Place value to thousands place | 1 | 2 | 3 | 4 |
| 40. | Place value beyond thousands place | 1 | 2 | 3 | 4 |
| 41. | Reading numerals in decimal notation | 1 | 2 | 3 | 4 |
| 42. | Reading and writing numerals in fraction and mixed numeral notation | 1 | 2 | 3 | 4 |
| 43. | Basic facts for 0--9 for all operations | 1 | 2 | 3 | 4 |
| 44. | Addition of 3 or more 3-digit numbers | 1 | 2 | 3 | 4 |
| 45. | Subtraction involving renaming | 1 | 2 | 3 | 4 |
| 46. | Understanding the multiplication algorithm | 1 | 2 | 3 | 4 |
| 47. | Understanding the division algorithm | 1 | 2 | 3 | 4 |
| 48. | Addition and subtraction of fractions | 1 | 2 | 3 | 4 |
| 49. | Multiplication of fractions | 1 | 2 | 3 | 4 |
| 50. | Division of fractions | 1 | 2 | 3 | 4 |
| 51. | Solving prercent problems | | | | |
| | a) finding percent of a number | 1 | 2 | 3 | 4 |
| | b) finding a number when a percent of it is known | 1 | 2 | 3 | 4 |
| | c) finding what percent one number is of another | 1 | 2 | 3 | 4 |
| 52. | Ratio and proportion | 1 | 2 | 3 | 4 |
| 53. | Problem solving skills | 1 | 2 | 3 | 4 |
| 54. | Geometry concepts | | | | |
| | a) plane figures | 1 | 2 | 3 | 4 |
| | b) solids | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| 55. | Measurement | | | | |
| | a) English system | 1 | 2 | 3 | 4 |
| | b) metric system | 1 | 2 | 3 | 4 |
| | c) perimeter | 1 | 2 | 3 | 4 |
| | d) area | 1 | 2 | 3 | 4 |
| | e) volume | 1 | 2 | 3 | 4 |
| 56. | Time concepts including the calendar | 1 | 2 | 3 | 4 |
| 57. | Tables and graphs | 1 | 2 | 3 | 4 |
| 58. | Map reading skills | 1 | 2 | 3 | 4 |
| 59. | Statistics | 1 | 2 | 3 | 4 |

# APPENDIX B

## LETTER AND FORMS FOR THE PRINCIPAL

Dear Principal:

What are your feelings about the teaching of basic skills in mathematics? Since the "back-to-basics" movement is growing and will become an increasingly important influence on teachers and school curricula, mathematics educators are concerned about this trend as it relates to the teaching of mathematics. With the endorsement of the Mathematics Department of Delta State University and the Mississippi Council of Teachers of Mathematics, I am conducting a study to determine the emphasis placed on basic skills in mathematics and the importance attached to the teaching of these skills by elementary public school teachers in Mississippi. Your school is one of a random sample of Mississippi public elementary schools selected to participate in this study.

Would you be willing to allocate a few minutes of your and your teachers' time during preplanning faculty meetings at the beginning of school to complete a questionnaire regarding the teaching of basic skills in mathematics? Completion of the questionnaire should take no more than ten or fifteen minutes of your teachers' time. If you are willing to participate, I will send the questionnaires to you for completion by the teachers at the time of your choice during your preplanning meetings, and ask that you return the questionnaires to me in the postage paid envelope that I will provide. After the study has been completed, I will be glad to share the results with you so you can see your school's position regarding the teaching of basic skills in mathematics in comparison with other schools in the state. The teachers will not identify themselves on the questionnaire, and the information collected will be connected with your school only for the purpose of letting you see your school's position in comparison to other schools in the state.

Your assistance in obtaining a valid expression of teachers' opinions on a very important educational issue will be appreciated. The enclosed form and envelope are for your reply. I look forward to hearing from you.

Sincerely,

Rose Strahan
Assistant Professor of Mathematics
President-Elect of the Mississippi
Council of Teachers of Mathematics

_____I agree to have the teachers in my school participate in your study regarding the teaching of basic skills in mathematics and will have the teachers complete the questionnaires during faculty meetings prior to the opening of the 1978-79 session.

_____Approximate number of teachers teaching mathematics in grades 1 through 3

_____Approximate number of teachers teaching mathematics in grades 4 through 6

_____ I do not agree to have the teachers in my school participate.

Name_____

School _____

Address _____

_____

TO BE COMPLETED BY THE PRINCIPAL

County_____ School_____

Approximate enrollment for the school_____

Number of teachers who teach mathematics_____

Number of teachers who completed the questionnaire _____

To what extent is your school involved in placing special emphasis on teaching and testing for basic skills? (check one)

_____No action has been taken on these ideas.

_____We are thinking about doing something.

_____We are in the process of examining our curriculum and developing appropriate tests and instructional materials.

_____We have implemented a basic skills program.

# APPENDIX C

## DATA FOR PRE-LITERACY LEVEL

Table 16

RESULTS OF BASIC SKILLS QUESTIONNAIRE

Pre-Literacy Skills

EMPHASIS

I. Conservation of Numerousness

| Skill Number | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1 | 217 | 4 | 23 | 86 | 104 |
| 2 | 218 | 1 | 23 | 93 | 101 |
| 3 | 216 | 4 | 30 | 99 | 83 |

II. Counting

| | | | | | |
|---|---|---|---|---|---|
| 4 | 218 | 4 | 26 | 87 | 101 |
| 5 | 219 | 4 | 32 | 62 | 121 |
| 6 | 221 | 3 | 6 | 58 | 154 |
| 7 | 219 | 1 | 14 | 68 | 136 |
| 8 | 221 | 8 | 29 | 61 | 123 |

III. Identification of Numerals

| | | | | | |
|---|---|---|---|---|---|
| 9 | 219 | 5 | 16 | 26 | 172 |
| 10 | 221 | 2 | 10 | 33 | 176 |
| 11 | 212 | 42 | 40 | 60 | 70 |
| 12 | 215 | 5 | 11 | 54 | 145 |
| 13 | 221 | 0 | 31 | 106 | 84 |
| 14 | 221 | 7 | 48 | 93 | 73 |

Table 16 - continued

IV. Operations With Numbers

| Skill Number | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 15 | 221 | 0 | 4 | 18 | 199 |
| 16 | 221 | 2 | 3 | 20 | 196 |
| 17 | 214 | 68 | 32 | 39 | 75 |
| 18 | 211 | 90 | 31 | 31 | 59 |
| 19 | 212 | 15 | 22 | 52 | 123 |
| 20 | 221 | 3 | 10 | 71 | 137 |

V. Measurement Without Number

| | | | | | |
|---|---|---|---|---|---|
| 21 | 222 | 4 | 17 | 66 | 135 |
| 22 | 215 | 48 | 51 | 80 | 36 |
| 23 | 221 | 4 | 22 | 98 | 97 |
| 24 | 221 | 2 | 17 | 96 | 106 |
| 25 | 220 | 13 | 58 | 96 | 53 |
| 26 | 216 | 2 | 17 | 81 | 116 |
| 27a | 219 | 31 | 29 | 63 | 96 |
| 27b | 194 | 39 | 22 | 69 | 64 |

VI. Measurement With Number

| | | | | | |
|---|---|---|---|---|---|
| 28 | 220 | 7 | 36 | 87 | 90 |
| 29 | 214 | 15 | 65 | 88 | 46 |
| 30 | 217 | 41 | 73 | 68 | 35 |
| 31 | 215 | 102 | 51 | 50 | 12 |
| 32 | 213 | 138 | 28 | 37 | 10 |

Table 16 - continued

| Skill Number | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 33 | 210 | 136 | 36 | 24 | 14 |
| 34 | 212 | 147 | 30 | 29 | 6 |
| 35 | 213 | 140 | 32 | 25 | 16 |
| 36 | 214 | 28 | 46 | 55 | 85 |

IMPORTANCE

I. Conservation of Numerousness

| | | | | | |
|---|---|---|---|---|---|
| 37 | 219 | 2 | 19 | 51 | 147 |
| 38 | 220 | 1 | 13 | 69 | 137 |
| 39 | 217 | 3 | 19 | 72 | 123 |

II. Counting

| | | | | | |
|---|---|---|---|---|---|
| 40 | 200 | 1 | 8 | 12 | 199 |
| 41 | 221 | 2 | 9 | 30 | 180 |
| 42 | 221 | 1 | 4 | 31 | 185 |
| 43 | 219 | 1 | 3 | 31 | 184 |
| 44 | 221 | 1 | 11 | 43 | 166 |

III. Identification of Numerals

| | | | | | |
|---|---|---|---|---|---|
| 45 | 221 | 0 | 4 | 22 | 195 |
| 46 | 218 | 5 | 11 | 39 | 163 |
| 47 | 216 | 28 | 36 | 61 | 91 |
| 48 | 217 | 0 | 22 | 81 | 114 |
| 49 | 218 | 36 | 50 | 73 | 59 |

Table 16 - continued

IV. Operations With Numbers

| Skill Number | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 50 | 219 | 2 | 2 | 9 | 206 |
| 51 | 219 | 1 | 1 | 8 | 209 |
| 52 | 218 | 48 | 26 | 40 | 104 |
| 53 | 217 | 65 | 34 | 32 | 86 |
| 54 | 218 | 6 | 15 | 52 | 145 |

V. Measurement Without Number

| | | | | | |
|---|---|---|---|---|---|
| 55 | 217 | 15 | 56 | 88 | 58 |

VI. Measurement With Number

| | | | | | |
|---|---|---|---|---|---|
| 56 | 215 | 4 | 34 | 86 | 91 |
| 57 | 213 | 17 | 46 | 94 | 56 |
| 58 | 214 | 60 | 47 | 72 | 35 |
| 59 | 211 | 61 | 50 | 66 | 34 |
| 60 | 220 | 0 | 5 | 54 | 161 |

Table 17

PRE-LITERACY

NUMBER OF YEARS OF TEACHING EXPERIENCE

| 0 to 5 Years Experience | | | | | | | More Than 5 Years Experience | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | EMPHASIS | | | | | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
| I. Conservation of Numerousness | | | | | | | | | | | |
| 1 | 61 | 1 | 5 | 27 | 28 | 1 | 156 | 3 | 18 | 59 | 76 |
| 2 | 61 | 0 | 5 | 28 | 28 | 2 | 157 | 1 | 18 | 65 | 73 |
| 3 | 60 | 0 | 7 | 29 | 24 | 3 | 156 | 4 | 23 | 70 | 59 |
| II. Counting | | | | | | | | | | | |
| 4 | 60 | 2 | 9 | 24 | 25 | 4 | 158 | 2 | 17 | 63 | 76 |
| 5 | 63 | 0 | 10 | 20 | 33 | 5 | 156 | 4 | 22 | 42 | 88 |
| 6 | 63 | 3 | 3 | 18 | 39 | 6 | 158 | 0 | 3 | 40 | 115 |

Table 17 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 63 | 1 | 8 | 18 | 36 | 7 | 156 | 0 | 6 | 50 | 100 |
| 8 | 63 | 3 | 11 | 14 | 35 | 8 | 158 | 5 | 18 | 47 | 88 |
| III. Identification of Numbers | | | | | | | | | | | |
| 9 | 62 | 1 | 3 | 3 | 55 | 9 | 157 | 4 | 13 | 23 | 117 |
| 10 | 63 | 1 | 3 | 6 | 53 | 10 | 158 | 1 | 7 | 27 | 123 |
| 11 | 60 | 15 | 16 | 13 | 16 | 11 | 152 | 27 | 24 | 47 | 54 |
| 12 | 61 | 3 | 6 | 17 | 35 | 12 | 154 | 2 | 5 | 37 | 110 |
| 13 | 62 | 0 | 15 | 30 | 17 | 13 | 159 | 0 | 16 | 76 | 67 |
| 14 | 63 | 3 | 23 | 25 | 12 | 14 | 158 | 4 | 25 | 68 | 61 |
| IV. Operations With Numbers | | | | | | | | | | | |
| 15 | 63 | 0 | 0 | 4 | 59 | 15 | 158 | 0 | 4 | 14 | 140 |
| 16 | 63 | 0 | 0 | 2 | 61 | 16 | 158 | 2 | 3 | 18 | 135 |
| 17 | 60 | 27 | 10 | 8 | 15 | 17 | 154 | 41 | 22 | 31 | 60 |

Table 17 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | 60 | 31 | 8 | 7 | 14 | 18 | 151 | 59 | 23 | 24 | 45 |
| 19 | 60 | 3 | 9 | 18 | 30 | 19 | 152 | 12 | 13 | 34 | 93 |
| 20 | 62 | 2 | 3 | 21 | 36 | 20 | 159 | 1 | 7 | 50 | 101 |
| V. Measurement Without Number | | | | | | | | | | | |
| 21 | 63 | 0 | 2 | 23 | 38 | 21 | 159 | 4 | 15 | 43 | 97 |
| 22 | 62 | 22 | 12 | 21 | 7 | 22 | 153 | 26 | 39 | 59 | 29 |
| 23 | 63 | 2 | 6 | 28 | 27 | 23 | 158 | 2 | 16 | 70 | 70 |
| 24 | 63 | 1 | 3 | 30 | 29 | 24 | 158 | 1 | 14 | 66 | 77 |
| 25 | 63 | 5 | 17 | 29 | 12 | 25 | 157 | 8 | 41 | 67 | 41 |
| 26 | 61 | 1 | 5 | 23 | 32 | 26 | 155 | 1 | 12 | 58 | 84 |
| 27a | 62 | 10 | 9 | 19 | 24 | 27a | 157 | 21 | 20 | 44 | 72 |
| 27b | 56 | 14 | 9 | 18 | 15 | 27b | 138 | 25 | 13 | 51 | 49 |
| VI. Measurement With Number | | | | | | | | | | | |
| 28 | 61 | 4 | 14 | 24 | 19 | 28 | 159 | 3 | 22 | 63 | 71 |
| 29 | 61 | 9 | 20 | 22 | 10 | 29 | 153 | 6 | 45 | 66 | 36 |

Table 17 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 62 | 15 | 27 | 15 | 5 | 30 | 155 | 26 | 46 | 53 | 30 |
| 31 | 61 | 36 | 15 | 7 | 3 | 31 | 154 | 66 | 36 | 43 | 9 |
| 32 | 61 | 46 | 8 | 4 | 3 | 32 | 152 | 92 | 20 | 33 | 7 |
| 33 | 62 | 42 | 13 | 4 | 3 | 33 | 148 | 94 | 23 | 20 | 11 |
| 34 | 61 | 47 | 10 | 2 | 2 | 34 | 152 | 100 | 20 | 27 | 4 |
| 35 | 61 | 49 | 6 | 2 | 4 | 35 | 152 | 91 | 26 | 23 | 12 |
| 36 | 62 | 15 | 15 | 12 | 20 | 36 | 152 | 13 | 31 | 43 | 65 |
| | | | | | IMPORTANCE | | | | | | |
| | | | | | I. Conservation of Numerousness | | | | | | |
| 37 | 63 | 1 | 5 | 12 | 45 | 37 | 156 | 1 | 14 | 39 | 102 |
| 38 | 63 | 0 | 5 | 17 | 41 | 38 | 157 | 1 | 8 | 52 | 96 |
| 39 | 63 | 1 | 8 | 18 | 36 | 39 | 154 | 2 | 11 | 54 | 87 |
| | | | | | II. Counting | | | | | | |
| 40 | 63 | 0 | 1 | 2 | 60 | 40 | 157 | 1 | 7 | 10 | 139 |
| 41 | 63 | 1 | 4 | 9 | 49 | 41 | 158 | 1 | 5 | 21 | 131 |

Table 17 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 63 | 1 | 2 | 13 | 47 | 42 | 158 | 0 | 2 | 18 | 138 |
| 43 | 62 | 1 | 1 | 12 | 48 | 43 | 157 | 0 | 2 | 19 | 136 |
| 44 | 63 | 1 | 6 | 12 | 44 | 44 | 158 | 0 | 5 | 31 | 122 |
| | | | | | III. Identification of Numerals | | | | | | |
| 45 | 63 | 0 | 2 | 2 | 59 | 45 | 158 | 0 | 2 | 20 | 136 |
| 46 | 63 | 3 | 5 | 12 | 43 | 46 | 155 | 2 | 6 | 27 | 120 |
| 47 | 61 | 14 | 8 | 19 | 20 | 47 | 155 | 14 | 28 | 42 | 71 |
| 48 | 62 | 0 | 12 | 25 | 25 | 48 | 155 | 0 | 10 | 56 | 89 |
| 49 | 63 | 15 | 18 | 14 | 16 | 49 | 155 | 21 | 32 | 59 | 43 |
| | | | | | IV. Operations With Numbers | | | | | | |
| 50 | 63 | 0 | 0 | 3 | 60 | 50 | 156 | 2 | 2 | 6 | 146 |
| 51 | 63 | 0 | 0 | 3 | 60 | 51 | 156 | 1 | 1 | 5 | 149 |
| 52 | 62 | 20 | 5 | 11 | 26 | 52 | 156 | 28 | 21 | 29 | 78 |
| 53 | 62 | 25 | 6 | 7 | 24 | 53 | 155 | 40 | 28 | 25 | 62 |
| 54 | 63 | 1 | 8 | 18 | 36 | 54 | 155 | 5 | 7 | 34 | 109 |

Table 17 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 55 | 63 | 7 | 16 | 17 | 23 | 55 | 154 | 8 | 40 | 71 | 35 |
| VI. Measurement With Number | | | | | | | | | | | |
| 56 | 62 | 2 | 11 | 24 | 25 | 56 | 153 | 2 | 23 | 62 | 66 |
| 57 | 63 | 7 | 18 | 20 | 18 | 57 | 150 | 10 | 28 | 74 | 38 |
| 58 | 62 | 23 | 16 | 13 | 10 | 58 | 152 | 37 | 31 | 59 | 25 |
| 59 | 62 | 26 | 14 | 13 | 9 | 59 | 149 | 35 | 36 | 53 | 25 |
| 60 | 63 | 0 | 2 | 16 | 45 | 60 | 157 | 0 | 3 | 33 | 116 |

Table 18

PRE-LITERACY

NUMBER OF MATHEMATICS COURSES

| No Mathematics Course in Last 5 Years | | | | | | | 1 or More Mathematics Courses in Last 5 Years | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EMPHASIS | | | | | | | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
| I. Conservation of Numerousness | | | | | | | | | | | | |
| 1 | 71 | 2 | 8 | 32 | 29 | | 1 | 134 | 2 | 15 | 49 | 68 |
| 2 | 70 | 1 | 11 | 28 | 30 | | 2 | 136 | 0 | 12 | 57 | 67 |
| 3 | 71 | 4 | 13 | 28 | 26 | | 3 | 134 | 0 | 17 | 63 | 54 |
| II. Counting | | | | | | | | | | | | |
| 4 | 70 | 4 | 9 | 22 | 35 | | 4 | 136 | 0 | 17 | 60 | 59 |
| 5 | 71 | 1 | 14 | 16 | 40 | | 5 | 136 | 2 | 17 | 42 | 75 |
| 6 | 72 | 0 | 1 | 24 | 47 | | 6 | 137 | 3 | 4 | 31 | 99 |
| 7 | 71 | 0 | 4 | 25 | 42 | | 7 | 137 | 1 | 9 | 40 | 87 |
| 8 | 72 | 2 | 8 | 21 | 41 | | 8 | 138 | 6 | 20 | 37 | 75 |

Table 18 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| III. Identification of Numerals | | | | | | | | | | | |
| 9 | 70 | 1 | 8 | 3 | 58 | 9 | 137 | 4 | 6 | 22 | 105 |
| 10 | 72 | 1 | 3 | 7 | 61 | 10 | 137 | 1 | 6 | 23 | 107 |
| 11 | 69 | 18 | 9 | 24 | 18 | 11 | 133 | 22 | 29 | 35 | 47 |
| 12 | 71 | 2 | 3 | 19 | 47 | 12 | 133 | 3 | 8 | 32 | 90 |
| 13 | 72 | 0 | 12 | 29 | 31 | 13 | 138 | 0 | 18 | 71 | 49 |
| 14 | 72 | 3 | 16 | 28 | 25 | 14 | 138 | 4 | 30 | 60 | 44 |
| IV. Operations With Numbers | | | | | | | | | | | |
| 15 | 71 | 0 | 3 | 5 | 63 | 15 | 138 | 0 | 1 | 12 | 125 |
| 16 | 71 | 1 | 2 | 4 | 64 | 16 | 138 | 1 | 1 | 15 | 121 |
| 17 | 70 | 20 | 13 | 14 | 23 | 17 | 133 | 46 | 19 | 22 | 46 |
| 18 | 69 | 30 | 9 | 14 | 16 | 18 | 131 | 57 | 21 | 12 | 41 |
| 19 | 69 | 3 | 8 | 16 | 42 | 19 | 132 | 12 | 13 | 32 | 75 |
| 20 | 71 | 1 | 5 | 24 | 41 | 20 | 138 | 2 | 5 | 44 | 87 |

Table 18 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 21 | 72 | 1 | 5 | 24 | 42 | 21 | 138 | 3 | 11 | 39 | 85 |
| 22 | 70 | 20 | 21 | 22 | 7 | 22 | 134 | 27 | 28 | 53 | 26 |
| 23 | 72 | 2 | 12 | 31 | 27 | 23 | 137 | 2 | 9 | 63 | 63 |
| 24 | 72 | 2 | 10 | 28 | 32 | 24 | 137 | 0 | 7 | 63 | 67 |
| 25 | 72 | 6 | 21 | 32 | 13 | 25 | 136 | 7 | 35 | 58 | 36 |
| 26 | 71 | 1 | 7 | 26 | 37 | 26 | 135 | 1 | 9 | 52 | 73 |
| 27a | 72 | 13 | 12 | 19 | 28 | 27a | 136 | 17 | 16 | 40 | 63 |
| 27b | 68 | 14 | 14 | 22 | 18 | 27b | 119 | 25 | 8 | 44 | 42 |
| VI. Measurement With Number | | | | | | | | | | | |
| 28 | 72 | 0 | 16 | 27 | 29 | 28 | 136 | 7 | 17 | 56 | 56 |
| 29 | 71 | 3 | 25 | 27 | 16 | 29 | 133 | 12 | 38 | 56 | 27 |
| 30 | 70 | 15 | 28 | 16 | 11 | 30 | 135 | 24 | 42 | 46 | 23 |
| 31 | 71 | 36 | 22 | 10 | 3 | 31 | 133 | 63 | 27 | 34 | 9 |
| 32 | 71 | 53 | 6 | 9 | 3 | 32 | 131 | 81 | 20 | 23 | 7 |

Table 18 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 69 | 51 | 10 | 4 | 4 | | 33 | 131 | 80 | 24 | 17 | 10 |
| 34 | 69 | 56 | 6 | 5 | 2 | | 34 | 132 | 86 | 22 | 20 | 4 |
| 35 | 71 | 53 | 6 | 7 | 5 | | 35 | 131 | 82 | 25 | 14 | 10 |
| 36 | 70 | 5 | 19 | 17 | 29 | | 36 | 133 | 22 | 26 | 35 | 50 |
| | | | | | | IMPORTANCE | | | | | | |
| | | | | | | I. Conservation of Numerousness | | | | | | |
| 37 | 70 | 0 | 7 | 17 | 46 | | 37 | 137 | 2 | 12 | 30 | 93 |
| 38 | 71 | 0 | 5 | 24 | 42 | | 38 | 137 | 1 | 8 | 40 | 88 |
| 39 | 71 | 0 | 6 | 28 | 37 | | 39 | 136 | 3 | 13 | 39 | 81 |
| | | | | | | II. Counting | | | | | | |
| 40 | 71 | 1 | 3 | 5 | 62 | | 40 | 137 | 0 | 4 | 7 | 126 |
| 41 | 71 | 1 | 1 | 10 | 59 | | 41 | 138 | 1 | 7 | 19 | 111 |
| 42 | 71 | 0 | 2 | 9 | 60 | | 42 | 138 | 1 | 1 | 21 | 115 |
| 43 | 70 | 0 | 2 | 11 | 57 | | 43 | 137 | 1 | 0 | 20 | 116 |

Table 18 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 | 70 | 0 | 4 | 15 | 51 | 44 | 139 | 1 | 5 | 27 | 106 |
| III. Identification of Numerals | | | | | | | | | | | |
| 45 | 71 | 0 | 1 | 8 | 62 | 45 | 138 | 0 | 3 | 13 | 122 |
| 46 | 71 | 1 | 5 | 15 | 50 | 46 | 136 | 4 | 6 | 23 | 103 |
| 47 | 68 | 8 | 15 | 17 | 28 | 47 | 137 | 20 | 19 | 44 | 54 |
| 48 | 70 | 0 | 8 | 23 | 39 | 48 | 135 | 0 | 14 | 54 | 67 |
| 49 | 70 | 10 | 22 | 18 | 20 | 49 | 136 | 25 | 27 | 49 | 35 |
| IV. Operations With Numbers | | | | | | | | | | | |
| 50 | 71 | 0 | 1 | 3 | 67 | 50 | 136 | 2 | 1 | 6 | 127 |
| 51 | 70 | 0 | 1 | 3 | 66 | 51 | 137 | 1 | 0 | 5 | 131 |
| 52 | 71 | 15 | 13 | 11 | 32 | 52 | 136 | 31 | 13 | 26 | 66 |
| 53 | 71 | 19 | 12 | 13 | 27 | 53 | 135 | 43 | 22 | 14 | 56 |
| 54 | 70 | 1 | 4 | 15 | 50 | 54 | 136 | 5 | 11 | 35 | 85 |
| V. Measurement Without Number | | | | | | | | | | | |
| 55 | 71 | 5 | 22 | 28 | 16 | 55 | 134 | 10 | 32 | 54 | 38 |

Table 18 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VI. Measurement With Number | | | | | | | | | | | |
| 56 | 71 | 0 | 14 | 28 | 29 | 56 | 133 | 3 | 20 | 56 | 54 |
| 57 | 70 | 2 | 21 | 27 | 20 | 57 | 131 | 14 | 23 | 64 | 30 |
| 58 | 70 | 21 | 20 | 18 | 11 | 58 | 132 | 37 | 26 | 49 | 20 |
| 59 | 70 | 20 | 23 | 18 | 9 | 59 | 129 | 38 | 26 | 44 | 21 |
| 60 | 71 | 0 | 1 | 21 | 49 | 60 | 137 | 0 | 4 | 33 | 100 |

Table 19

PRE-LITERACY

AMOUNT OF TIME SPENT TEACHING MATHEMATICS PER DAY

| 40 or Less Minutes Per Day | | | | | | | More Than 40 Minutes Per Day | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Emphasis | | | | | | | Emphasis | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
| I. Conservation of Numerousness | | | | | | | | | | | | |
| 1 | 99 | 2 | 11 | 37 | 49 | | 1 | 115 | 2 | 12 | 47 | 54 |
| 2 | 98 | 0 | 12 | 41 | 45 | | 2 | 117 | 1 | 11 | 49 | 56 |
| 3 | 97 | 2 | 14 | 46 | 35 | | 3 | 116 | 2 | 16 | 50 | 48 |
| II. Counting | | | | | | | | | | | | |
| 4 | 99 | 3 | 11 | 40 | 45 | | 4 | 116 | 1 | 14 | 47 | 54 |
| 5 | 99 | 2 | 15 | 28 | 54 | | 5 | 117 | 2 | 17 | 33 | 65 |
| 6 | 99 | 2 | 5 | 31 | 61 | | 6 | 119 | 0 | 1 | 27 | 91 |
| 7 | 98 | 1 | 8 | 31 | 58 | | 7 | 118 | 0 | 6 | 35 | 77 |
| 8 | 98 | 4 | 17 | 33 | 44 | | 8 | 120 | 4 | 11 | 27 | 78 |

Table 19 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| III. Identification of Numerals | | | | | | | | | | | |
| 9 | 99 | 2 | 9 | 9 | 79 | 9 | 117 | 3 | 7 | 17 | 90 |
| 10 | 98 | 1 | 6 | 13 | 78 | 10 | 120 | 1 | 4 | 19 | 96 |
| 11 | 94 | 27 | 23 | 27 | 17 | 11 | 115 | 14 | 16 | 33 | 52 |
| 12 | 96 | 2 | 5 | 30 | 59 | 12 | 116 | 3 | 6 | 23 | 84 |
| 13 | 97 | 0 | 20 | 45 | 32 | 13 | 121 | 0 | 11 | 59 | 51 |
| 14 | 99 | 6 | 29 | 41 | 23 | 14 | 119 | 1 | 18 | 51 | 49 |
| IV. Operations With Numbers | | | | | | | | | | | |
| 15 | 99 | 0 | 0 | 10 | 89 | 15 | 119 | 0 | 4 | 8 | 107 |
| 16 | 99 | 2 | 0 | 12 | 85 | 16 | 119 | 0 | 3 | 8 | 108 |
| 17 | 93 | 38 | 17 | 20 | 18 | 17 | 118 | 29 | 15 | 18 | 56 |
| 18 | 92 | 45 | 20 | 11 | 16 | 18 | 116 | 44 | 11 | 19 | 42 |
| 19 | 95 | 6 | 14 | 27 | 48 | 19 | 114 | 9 | 8 | 23 | 74 |
| 20 | 99 | 3 | 2 | 30 | 64 | 20 | 119 | 0 | 8 | 39 | 72 |

Table 19 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 21 | 99 | 2 | 5 | 23 | 69 | 21 | 120 | 2 | 12 | 41 | 65 |
| 22 | 96 | 25 | 27 | 32 | 12 | 22 | 116 | 23 | 24 | 46 | 23 |
| 23 | 99 | 3 | 11 | 36 | 49 | 23 | 119 | 1 | 11 | 61 | 46 |
| 24 | 99 | 2 | 7 | 36 | 54 | 24 | 119 | 0 | 10 | 58 | 51 |
| 25 | 99 | 9 | 27 | 38 | 25 | 25 | 118 | 4 | 31 | 55 | 28 |
| 26 | 98 | 1 | 12 | 45 | 40 | 26 | 116 | 1 | 5 | 36 | 74 |
| 27a | 98 | 21 | 15 | 32 | 30 | 27a | 118 | 10 | 13 | 31 | 64 |
| 27b | 81 | 20 | 10 | 30 | 21 | 27b | 110 | 19 | 11 | 39 | 41 |
| VI. Measurement With Number | | | | | | | | | | | |
| 28 | 98 | 4 | 21 | 39 | 34 | 28 | 119 | 3 | 14 | 47 | 55 |
| 29 | 94 | 8 | 35 | 31 | 20 | 29 | 117 | 6 | 29 | 57 | 25 |
| 30 | 97 | 19 | 40 | 26 | 12 | 30 | 117 | 20 | 33 | 41 | 23 |
| 31 | 94 | 51 | 23 | 16 | 4 | 31 | 118 | 49 | 27 | 34 | 8 |
| 32 | 93 | 64 | 13 | 14 | 2 | 32 | 117 | 72 | 15 | 22 | 8 |
| 33 | 90 | 61 | 16 | 9 | 4 | 33 | 117 | 73 | 20 | 14 | 10 |

Table 19 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | 94 | 70 | 12 | 11 | 1 | 34 | 115 | 75 | 17 | 18 | 5 |
| 35 | 93 | 67 | 13 | 8 | 5 | 35 | 117 | 72 | 19 | 16 | 10 |
| 36 | 93 | 18 | 26 | 19 | 30 | 36 | 118 | 10 | 19 | 36 | 53 |
| | | | | | | IMPORTANCE | | | | | |
| | | | | | | I. Conservation of Numerousness | | | | | |
| 37 | 98 | 1 | 10 | 19 | 68 | 37 | 118 | 1 | 9 | 30 | 78 |
| 38 | 98 | 0 | 7 | 29 | 62 | 38 | 119 | 1 | 6 | 37 | 75 |
| 39 | 96 | 2 | 11 | 32 | 51 | 39 | 118 | 1 | 8 | 37 | 72 |
| | | | | | | II. Counting | | | | | |
| 40 | 98 | 0 | 3 | 4 | 91 | 40 | 119 | 1 | 5 | 6 | 107 |
| 41 | 98 | 0 | 6 | 16 | 76 | 41 | 120 | 1 | 3 | 14 | 102 |
| 42 | 98 | 0 | 3 | 17 | 78 | 42 | 120 | 0 | 1 | 14 | 105 |
| 43 | 96 | 0 | 2 | 17 | 77 | 43 | 120 | 0 | 1 | 14 | 105 |
| 44 | 98 | 1 | 4 | 24 | 69 | 44 | 120 | 0 | 7 | 17 | 96 |

Table 19 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| III. Identification of Numerals | | | | | | | | | | | |
| 45 | 98 | 0 | 3 | 8 | 87 | 45 | 120 | 0 | 1 | 13 | 106 |
| 46 | 96 | 5 | 5 | 22 | 64 | 46 | 119 | 0 | 5 | 16 | 98 |
| 47 | 96 | 18 | 21 | 26 | 31 | 47 | 117 | 9 | 15 | 34 | 59 |
| 48 | 97 | 0 | 14 | 43 | 40 | 48 | 117 | 0 | 8 | 36 | 73 |
| 49 | 97 | 21 | 29 | 27 | 20 | 49 | 118 | 1 | 1 | 4 | 112 |
| IV. Operations With Numbers | | | | | | | | | | | |
| 50 | 98 | 1 | 1 | 5 | 91 | 50 | 118 | 1 | 1 | 4 | 112 |
| 51 | 97 | 1 | 0 | 5 | 91 | 51 | 120 | 0 | 1 | 3 | 116 |
| 52 | 95 | 31 | 16 | 20 | 28 | 52 | 120 | 16 | 10 | 19 | 75 |
| 53 | 94 | 38 | 17 | 15 | 24 | 53 | 120 | 26 | 17 | 16 | 61 |
| 54 | 98 | 1 | 10 | 24 | 63 | 54 | 117 | 5 | 5 | 27 | 80 |
| V. Measurement Without Number | | | | | | | | | | | |
| 55 | 96 | 9 | 24 | 37 | 26 | 55 | 118 | 5 | 32 | 50 | 31 |

Table 19 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VI. Measurement With Number | | | | | | | | | | | |
| 56 | 96 | 4 | 15 | 41 | 36 | 56 | 116 | 0 | 18 | 43 | 55 |
| 57 | 95 | 12 | 21 | 38 | 24 | 57 | 115 | 4 | 25 | 54 | 32 |
| 58 | 96 | 34 | 21 | 27 | 14 | 58 | 115 | 25 | 25 | 44 | 21 |
| 59 | 94 | 35 | 21 | 25 | 13 | 59 | 114 | 25 | 29 | 39 | 21 |
| 60 | 98 | 0 | 5 | 30 | 63 | 60 | 119 | 0 | 0 | 23 | 96 |

Table 20

PRE-LITERACY

DATE OF MOST RECENT DEGREE

| Degree Prior to 1973 | | | | | | | Degree in 1973 or After 1973 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | EMPHASIS | | | | | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
| I. Conservation of Numerousness | | | | | | | | | | | | |
| 1 | 108 | 2 | 10 | 40 | 56 | | 1 | 86 | 1 | 12 | 36 | 37 |
| 2 | 110 | 1 | 12 | 45 | 52 | | 2 | 86 | 0 | 10 | 39 | 37 |
| 3 | 108 | 4 | 15 | 46 | 43 | | 3 | 85 | 0 | 12 | 42 | 31 |
| II. Counting | | | | | | | | | | | | |
| 4 | 111 | 2 | 11 | 41 | 57 | | 4 | 84 | 1 | 12 | 37 | 34 |
| 5 | 109 | 3 | 19 | 30 | 57 | | 5 | 88 | 1 | 11 | 24 | 52 |
| 6 | 111 | 0 | 2 | 29 | 80 | | 6 | 87 | 3 | 3 | 23 | 58 |
| 7 | 109 | 0 | 6 | 39 | 64 | | 7 | 88 | 0 | 7 | 25 | 56 |
| 8 | 110 | 5 | 13 | 24 | 68 | | 8 | 88 | 2 | 14 | 29 | 43 |

Table 20 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| III. Identification of Numerals | | | | | | | | | | | |
| 9 | 109 | 1 | 11 | 19 | 78 | 9 | 87 | 3 | 4 | 7 | 73 |
| 10 | 110 | 0 | 4 | 17 | 89 | 10 | 88 | 2 | 4 | 13 | 69 |
| 11 | 104 | 19 | 15 | 34 | 36 | 11 | 85 | 19 | 22 | 20 | 24 |
| 12 | 109 | 0 | 7 | 25 | 77 | 12 | 85 | 5 | 4 | 21 | 55 |
| 13 | 111 | 0 | 16 | 47 | 48 | 13 | 87 | 0 | 12 | 48 | 27 |
| 14 | 110 | 2 | 16 | 48 | 44 | 14 | 88 | 3 | 27 | 39 | 19 |
| IV. Operations With Numbers | | | | | | | | | | | |
| 15 | 110 | 0 | 2 | 10 | 98 | 15 | 88 | 0 | 1 | 7 | 80 |
| 16 | 110 | 1 | 2 | 12 | 95 | 16 | 88 | 1 | 0 | 7 | 80 |
| 17 | 107 | 25 | 14 | 25 | 43 | 17 | 84 | 35 | 17 | 14 | 18 |
| 18 | 104 | 35 | 17 | 21 | 31 | 18 | 85 | 46 | 14 | 8 | 17 |
| 19 | 106 | 5 | 9 | 24 | 68 | 19 | 84 | 7 | 10 | 24 | 43 |
| 20 | 111 | 1 | 5 | 38 | 67 | 20 | 87 | 2 | 3 | 27 | 55 |

Table 20 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 21 | 111 | 4 | 13 | 26 | 68 | 21 | 88 | 0 | 3 | 31 | 54 |
| 22 | 106 | 19 | 26 | 38 | 23 | 22 | 88 | 23 | 21 | 36 | 8 |
| 23 | 111 | 2 | 9 | 49 | 51 | 23 | 88 | 2 | 11 | 39 | 36 |
| 24 | 110 | 2 | 8 | 44 | 56 | 24 | 88 | 0 | 7 | 42 | 39 |
| 25 | 110 | 7 | 28 | 43 | 32 | 25 | 88 | 6 | 25 | 40 | 17 |
| 26 | 107 | 1 | 8 | 35 | 63 | 26 | 87 | 1 | 8 | 35 | 43 |
| 27a | 109 | 13 | 13 | 32 | 51 | 27a | 87 | 14 | 14 | 26 | 33 |
| 27b | 97 | 17 | 7 | 40 | 33 | 27b | 81 | 20 | 14 | 24 | 23 |
| VI. Measurement With Number | | | | | | | | | | | |
| 28 | 110 | 2 | 12 | 46 | 50 | 28 | 87 | 4 | 19 | 36 | 28 |
| 29 | 106 | 6 | 28 | 47 | 25 | 29 | 87 | 9 | 28 | 34 | 16 |
| 30 | 107 | 22 | 28 | 37 | 20 | 30 | 88 | 18 | 35 | 26 | 9 |
| 31 | 106 | 43 | 31 | 26 | 6 | 31 | 87 | 50 | 17 | 18 | 2 |
| 32 | 105 | 61 | 16 | 23 | 5 | 32 | 86 | 66 | 10 | 8 | 2 |

Table 20 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 103 | 64 | 18 | 15 | 6 | 33 | 86 | 62 | 13 | 8 | 3 |
| 34 | 104 | 68 | 14 | 20 | 2 | 34 | 86 | 68 | 11 | 6 | 1 |
| 35 | 105 | 66 | 14 | 18 | 7 | 35 | 86 | 65 | 13 | 3 | 5 |
| 36 | 105 | 7 | 24 | 26 | 48 | 36 | 87 | 17 | 20 | 21 | 29 |
| | | | | | | IMPORTANCE | | | | | |
| | | | | | | I. Conservation of Numerousness | | | | | |
| 37 | 108 | 1 | 8 | 26 | 73 | 37 | 88 | 1 | 7 | 21 | 59 |
| 38 | 109 | 1 | 6 | 31 | 71 | 38 | 88 | 0 | 7 | 28 | 53 |
| 39 | 107 | 2 | 9 | 31 | 65 | 39 | 87 | 1 | 9 | 28 | 49 |
| | | | | | | II. Counting | | | | | |
| 40 | 109 | 0 | 5 | 4 | 100 | 40 | 88 | 0 | 2 | 6 | 80 |
| 41 | 110 | 0 | 3 | 11 | 96 | 41 | 88 | 1 | 5 | 16 | 66 |
| 42 | 110 | 0 | 2 | 10 | 98 | 42 | 88 | 1 | 1 | 18 | 68 |
| 43 | 109 | 0 | 2 | 11 | 96 | 43 | 87 | 1 | 0 | 18 | 68 |
| 44 | 110 | 0 | 3 | 23 | 84 | 44 | 88 | 0 | 8 | 17 | 63 |

Table 20 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | III. Identification of Numerals | | | | | | |
| 45 | 110 | 0 | 1 | 11 | 98 | | 45 | 88 | 0 | 3 | 9 | 76 |
| 46 | 108 | 1 | 5 | 14 | 88 | | 46 | 88 | 4 | 5 | 20 | 59 |
| 47 | 107 | 7 | 19 | 28 | 53 | | 47 | 87 | 17 | 16 | 28 | 26 |
| 48 | 108 | 0 | 5 | 33 | 70 | | 48 | 87 | 0 | 14 | 41 | 32 |
| 49 | 108 | 12 | 23 | 37 | 36 | | 49 | 88 | 21 | 22 | 30 | 15 |
| | | | | | | IV. Operations With Numbers | | | | | | |
| 50 | 109 | 1 | 2 | 3 | 103 | | 50 | 88 | 0 | 0 | 3 | 85 |
| 51 | 110 | 1 | 0 | 4 | 105 | | 51 | 88 | 0 | 1 | 2 | 85 |
| 52 | 108 | 13 | 13 | 23 | 59 | | 52 | 87 | 27 | 13 | 15 | 32 |
| 53 | 107 | 23 | 18 | 20 | 46 | | 53 | 87 | 36 | 15 | 6 | 30 |
| 54 | 109 | 5 | 7 | 21 | 76 | | 54 | 87 | 1 | 6 | 25 | 55 |
| | | | | | | V. Measurement Without Number | | | | | | |
| 55 | 108 | 7 | 24 | 46 | 31 | | 55 | 87 | 7 | 26 | 34 | 20 |

Table 20 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VI. Measurement With Number | | | | | | | | | | | |
| 56 | 108 | 1 | 14 | 45 | 48 | 56 | 86 | 3 | 16 | 34 | 33 |
| 57 | 106 | 6 | 22 | 47 | 31 | 57 | 86 | 11 | 20 | 36 | 19 |
| 58 | 106 | 25 | 22 | 35 | 24 | 58 | 87 | 30 | 21 | 28 | 8 |
| 59 | 104 | 26 | 23 | 32 | 23 | 59 | 86 | 30 | 21 | 27 | 8 |
| 60 | 110 | 0 | 1 | 19 | 90 | 60 | 87 | 0 | 3 | 27 | 57 |

Table 21

PRE-LITERACY

BASIC SKILLS PROGRAM

| Have Basic Skills Program | | | | | | | Do Not Have Basic Skills Program | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | EMPHASIS | | | | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
| I. Conservation of Numerousness | | | | | | | | | | | |
| 1 | 54 | 1 | 6 | 16 | 31 | 1 | 127 | 2 | 12 | 52 | 61 |
| 2 | 56 | 0 | 6 | 21 | 29 | 2 | 125 | 0 | 11 | 56 | 58 |
| 3 | 54 | 0 | 10 | 22 | 22 | 3 | 125 | 3 | 12 | 62 | 48 |
| II. Counting | | | | | | | | | | | |
| 4 | 55 | 0 | 6 | 20 | 29 | 4 | 126 | 1 | 16 | 53 | 56 |
| 5 | 55 | 1 | 6 | 19 | 29 | 5 | 127 | 2 | 20 | 34 | 71 |
| 6 | 55 | 1 | 2 | 6 | 46 | 6 | 129 | 2 | 3 | 41 | 83 |
| 7 | 55 | 0 | 4 | 8 | 43 | 7 | 127 | 1 | 6 | 42 | 78 |
| 8 | 55 | 1 | 9 | 17 | 28 | 8 | 129 | 7 | 13 | 30 | 79 |

Table 21 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| III. Identification of Numerals | | | | | | | | | | | |
| 9 | 55 | 2 | 3 | 6 | 44 | 9 | 127 | 1 | 12 | 18 | 96 |
| 10 | 55 | 1 | 3 | 9 | 42 | 10 | 129 | 1 | 4 | 21 | 103 |
| 11 | 52 | 12 | 6 | 15 | 19 | 11 | 125 | 22 | 25 | 35 | 43 |
| 12 | 53 | 1 | 4 | 10 | 38 | 12 | 127 | 2 | 6 | 31 | 88 |
| 13 | 54 | 0 | 6 | 29 | 19 | 13 | 130 | 0 | 16 | 56 | 58 |
| 14 | 55 | 1 | 10 | 29 | 15 | 14 | 129 | 2 | 27 | 50 | 50 |
| IV. Operations With Numbers | | | | | | | | | | | |
| 15 | 56 | 0 | 0 | 6 | 50 | 15 | 128 | 0 | 2 | 10 | 116 |
| 16 | 56 | 0 | 0 | 8 | 48 | 16 | 128 | 1 | 2 | 9 | 116 |
| 17 | 51 | 14 | 8 | 12 | 17 | 17 | 126 | 37 | 20 | 24 | 45 |
| 18 | 54 | 20 | 9 | 8 | 17 | 18 | 121 | 51 | 19 | 16 | 35 |
| 19 | 51 | 2 | 4 | 21 | 24 | 19 | 126 | 12 | 12 | 22 | 80 |
| 20 | 55 | 0 | 0 | 18 | 37 | 20 | 129 | 1 | 8 | 37 | 83 |

Table 21 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 21 | 56 | 0 | 2 | 15 | 39 | 21 | 129 | 3 | 13 | 36 | 77 |
| 22 | 54 | 11 | 9 | 24 | 10 | 22 | 126 | 29 | 29 | 44 | 24 |
| 23 | 56 | 1 | 3 | 29 | 23 | 23 | 129 | 3 | 11 | 55 | 60 |
| 24 | 56 | 0 | 1 | 29 | 26 | 24 | 128 | 2 | 10 | 53 | 63 |
| 25 | 56 | 3 | 13 | 25 | 15 | 25 | 128 | 6 | 32 | 56 | 34 |
| 26 | 53 | 0 | 6 | 18 | 29 | 26 | 128 | 2 | 9 | 45 | 72 |
| 27a | 55 | 6 | 8 | 14 | 27 | 27a | 127 | 17 | 18 | 35 | 57 |
| 27b | 50 | 6 | 4 | 20 | 30 | 27b | 114 | 24 | 15 | 40 | 35 |
| VI. Measurement With Number | | | | | | | | | | | |
| 28 | 55 | 3 | 8 | 26 | 18 | 28 | 128 | 2 | 21 | 46 | 59 |
| 29 | 52 | 6 | 11 | 30 | 5 | 29 | 126 | 6 | 41 | 46 | 33 |
| 30 | 54 | 10 | 18 | 16 | 10 | 30 | 126 | 23 | 42 | 40 | 21 |
| 31 | 53 | 23 | 11 | 16 | 3 | 31 | 127 | 59 | 32 | 28 | 8 |
| 32 | 52 | 29 | 7 | 15 | 1 | 32 | 127 | 84 | 19 | 17 | 7 |

Table 21 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 52 | 30 | 9 | 8 | 5 | 33 | 125 | 85 | 20 | 13 | 7 |
| 34 | 52 | 28 | 9 | 13 | 2 | 34 | 125 | 94 | 17 | 12 | 2 |
| 35 | 52 | 29 | 7 | 12 | 4 | 35 | 126 | 85 | 23 | 10 | 8 |
| 36 | 55 | 8 | 11 | 15 | 21 | 36 | 124 | 14 | 24 | 32 | 54 |
| | | | | | | IMPORTANCE | | | | | |
| | | | | | | I. Conservation of Numerousness | | | | | |
| 37 | 56 | 1 | 7 | 10 | 38 | 37 | 128 | 1 | 7 | 33 | 87 |
| 38 | 56 | 0 | 3 | 17 | 36 | 38 | 128 | 1 | 6 | 43 | 78 |
| 39 | 54 | 0 | 5 | 17 | 32 | 39 | 127 | 2 | 9 | 46 | 70 |
| | | | | | | II. Counting | | | | | |
| 40 | 56 | 0 | 3 | 2 | 51 | 40 | 128 | 1 | 2 | 10 | 115 |
| 41 | 56 | 0 | 3 | 5 | 48 | 41 | 129 | 2 | 5 | 19 | 103 |
| 42 | 56 | 0 | 2 | 4 | 50 | 42 | 129 | 1 | 2 | 21 | 105 |
| 43 | 54 | 0 | 1 | 4 | 49 | 43 | 129 | 1 | 2 | 22 | 104 |
| 44 | 56 | 0 | 1 | 9 | 46 | 44 | 130 | 1 | 7 | 23 | 99 |

Table 21 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| III. Identification of Numerals | | | | | | | | | | | | |
| 45 | 56 | 0 | 1 | 10 | 45 | | 45 | 129 | 0 | 2 | 10 | 117 |
| 46 | 54 | 2 | 3 | 7 | 42 | | 46 | 129 | 2 | 7 | 24 | 96 |
| 47 | 54 | 2 | 9 | 16 | 27 | | 47 | 127 | 18 | 20 | 38 | 51 |
| 48 | 56 | 0 | 6 | 26 | 24 | | 48 | 128 | 0 | 13 | 39 | 76 |
| 49 | 55 | 6 | 9 | 22 | 18 | | 49 | 128 | 18 | 32 | 47 | 31 |
| IV. Operations With Numbers | | | | | | | | | | | | |
| 50 | 55 | 1 | 1 | 5 | 48 | | 50 | 129 | 1 | 1 | 2 | 125 |
| 51 | 55 | 1 | 0 | 4 | 50 | | 51 | 130 | 0 | 1 | 3 | 126 |
| 52 | 54 | 8 | 8 | 12 | 26 | | 52 | 128 | 27 | 13 | 22 | 66 |
| 53 | 54 | 10 | 9 | 12 | 23 | | 53 | 127 | 39 | 19 | 16 | 53 |
| 54 | 56 | 1 | 3 | 13 | 39 | | 54 | 127 | 4 | 8 | 32 | 83 |
| V. Measurement Without Number | | | | | | | | | | | | |
| 55 | 55 | 0 | 14 | 23 | 18 | | 55 | 128 | 13 | 33 | 50 | 32 |

Table 21 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VI. Measurement With Number | | | | | | | | | | | |
| 56 | 56 | 0 | 8 | 24 | 24 | 56 | 125 | 1 | 20 | 52 | 52 |
| 57 | 54 | 2 | 11 | 26 | 15 | 57 | 124 | 10 | 25 | 56 | 33 |
| 58 | 54 | 9 | 15 | 21 | 9 | 58 | 125 | 37 | 27 | 42 | 19 |
| 59 | 53 | 9 | 15 | 18 | 11 | 59 | 124 | 36 | 30 | 40 | 18 |
| 60 | 56 | 0 | 2 | 13 | 41 | 60 | 128 | 0 | 2 | 31 | 95 |

Table 22

PRE-LITERACY

ENROLLMENT OF SCHOOLS

| Less Than 500 | | | | | | EMPHASIS | 500 or More | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
| I. Conservation of Numerousness | | | | | | | | | | | |
| 1 | 99 | 1 | 12 | 40 | 46 | 1 | 88 | 2 | 8 | 32 | 46 |
| 2 | 98 | 0 | 10 | 44 | 44 | 2 | 89 | 0 | 9 | 37 | 43 |
| 3 | 97 | 0 | 13 | 49 | 35 | 3 | 88 | 3 | 11 | 39 | 35 |
| II. Counting | | | | | | | | | | | |
| 4 | 97 | 0 | 14 | 40 | 43 | 4 | 90 | 1 | 10 | 36 | 43 |
| 5 | 97 | 3 | 12 | 29 | 53 | 5 | 91 | 0 | 14 | 28 | 49 |
| 6 | 98 | 2 | 2 | 22 | 72 | 6 | 92 | 1 | 3 | 26 | 62 |
| 7 | 97 | 1 | 7 | 33 | 56 | 7 | 91 | 0 | 5 | 20 | 66 |
| 8 | 99 | 5 | 14 | 26 | 54 | 8 | 91 | 3 | 11 | 27 | 50 |

Table 22 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| III. Identification of Numerals | | | | | | | | | | | |
| 9 | 96 | 0 | 6 | 15 | 75 | 9 | 92 | 3 | 10 | 9 | 70 |
| 10 | 99 | 1 | 1 | 20 | 77 | 10 | 91 | 1 | 6 | 10 | 74 |
| 11 | 94 | 18 | 16 | 25 | 35 | 11 | 89 | 16 | 18 | 27 | 28 |
| 12 | 97 | 2 | 4 | 23 | 68 | 12 | 89 | 1 | 6 | 20 | 62 |
| 13 | 100 | 0 | 14 | 46 | 40 | 13 | 90 | 0 | 10 | 43 | 37 |
| 14 | 98 | 3 | 23 | 39 | 33 | 14 | 92 | 1 | 15 | 44 | 32 |
| IV. Operations With Numbers | | | | | | | | | | | |
| 15 | 98 | 0 | 0 | 5 | 93 | 15 | 92 | 0 | 2 | 11 | 79 |
| 16 | 98 | 1 | 0 | 6 | 91 | 16 | 92 | 0 | 2 | 11 | 79 |
| 17 | 97 | 28 | 15 | 15 | 39 | 17 | 86 | 26 | 15 | 21 | 24 |
| 18 | 95 | 40 | 13 | 14 | 28 | 18 | 86 | 35 | 16 | 10 | 25 |
| 19 | 96 | 9 | 11 | 16 | 60 | 19 | 87 | 5 | 6 | 27 | 49 |
| 20 | 99 | 1 | 3 | 32 | 63 | 20 | 91 | 0 | 5 | 24 | 62 |

Table 22 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 21 | 100 | 3 | 12 | 32 | 53 | 21 | 91 | 0 | 4 | 22 | 65 |
| 22 | 98 | 19 | 25 | 30 | 24 | 22 | 88 | 22 | 17 | 39 | 10 |
| 23 | 100 | 3 | 9 | 42 | 46 | 23 | 91 | 1 | 7 | 43 | 40 |
| 24 | 99 | 1 | 8 | 46 | 44 | 24 | 91 | 1 | 5 | 37 | 48 |
| 25 | 98 | 6 | 26 | 40 | 26 | 25 | 92 | 3 | 22 | 44 | 23 |
| 26 | 97 | 2 | 4 | 34 | 57 | 26 | 89 | 0 | 11 | 30 | 48 |
| 27a | 97 | 13 | 9 | 26 | 49 | 27a | 91 | 10 | 17 | 26 | 38 |
| 27b | 88 | 19 | 6 | 34 | 29 | 27b | 82 | 13 | 13 | 29 | 27 |
| VI. Measurement With Number | | | | | | | | | | | |
| 28 | 97 | 2 | 14 | 36 | 45 | 28 | 92 | 3 | 15 | 39 | 35 |
| 29 | 96 | 9 | 32 | 33 | 22 | 29 | 88 | 3 | 23 | 44 | 18 |
| 30 | 98 | 15 | 34 | 34 | 15 | 30 | 88 | 18 | 29 | 25 | 16 |
| 31 | 98 | 43 | 27 | 20 | 8 | 31 | 88 | 42 | 18 | 25 | 3 |
| 32 | 98 | 59 | 19 | 14 | 6 | 32 | 87 | 59 | 7 | 20 | 1 |

Table 22 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 96 | 57 | 23 | 10 | 6 | | 33 | 87 | 59 | 11 | 11 | 6 |
| 34 | 95 | 64 | 20 | 9 | 2 | | 34 | 88 | 61 | 9 | 16 | 2 |
| 35 | 97 | 61 | 20 | 11 | 5 | | 35 | 87 | 58 | 11 | 11 | 7 |
| 36 | 95 | 13 | 17 | 26 | 39 | | 36 | 90 | 9 | 20 | 25 | 36 |

IMPORTANCE

I. Conservation of Numerousness

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 99 | 0 | 7 | 28 | 64 | | 37 | 91 | 2 | 9 | 18 | 62 |
| 38 | 98 | 0 | 6 | 31 | 61 | | 38 | 92 | 1 | 5 | 31 | 55 |
| 39 | 97 | 0 | 9 | 36 | 52 | | 39 | 90 | 2 | 8 | 29 | 51 |

II. Counting

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 99 | 0 | 3 | 4 | 92 | | 40 | 91 | 1 | 2 | 8 | 80 |
| 41 | 99 | 1 | 5 | 8 | 85 | | 41 | 92 | 1 | 3 | 16 | 72 |
| 42 | 99 | 1 | 1 | 11 | 86 | | 42 | 92 | 0 | 3 | 14 | 75 |
| 43 | 99 | 1 | 1 | 10 | 87 | | 43 | 90 | 0 | 2 | 16 | 72 |
| 44 | 100 | 1 | 6 | 11 | 82 | | 44 | 92 | 0 | 4 | 22 | 66 |

Table 22 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| III. Identification of Numerals | | | | | | | | | | | |
| 45 | 99 | 0 | 1 | 6 | 92 | 45 | 92 | 0 | 2 | 14 | 76 |
| 46 | 99 | 2 | 6 | 14 | 77 | 46 | 90 | 2 | 4 | 18 | 66 |
| 47 | 98 | 16 | 13 | 23 | 46 | 47 | 89 | 6 | 16 | 33 | 34 |
| 48 | 98 | 0 | 11 | 34 | 53 | 48 | 92 | 0 | 8 | 35 | 49 |
| 49 | 99 | 14 | 29 | 31 | 25 | 49 | 90 | 12 | 14 | 39 | 25 |
| IV. Operations With Numbers | | | | | | | | | | | |
| 50 | 99 | 0 | 2 | 3 | 94 | 50 | 91 | 2 | 0 | 4 | 85 |
| 51 | 100 | 0 | 0 | 3 | 97 | 51 | 91 | 1 | 1 | 4 | 85 |
| 52 | 98 | 18 | 10 | 20 | 50 | 52 | 90 | 18 | 11 | 17 | 44 |
| 53 | 97 | 27 | 13 | 17 | 40 | 53 | 90 | 24 | 17 | 11 | 38 |
| 54 | 97 | 4 | 9 | 25 | 59 | 54 | 92 | 1 | 2 | 20 | 69 |
| V. Measurement Without Number | | | | | | | | | | | |
| 55 | 98 | 10 | 28 | 37 | 23 | 55 | 91 | 3 | 22 | 38 | 28 |

Table 22 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VI. Measurement With Number | | | | | | | | | | | |
| 56 | 96 | 1 | 21 | 35 | 39 | 56 | 91 | 0 | 9 | 42 | 40 |
| 57 | 95 | 6 | 20 | 45 | 24 | 57 | 89 | 6 | 20 | 38 | 25 |
| 58 | 97 | 23 | 25 | 34 | 15 | 58 | 88 | 27 | 17 | 30 | 14 |
| 59 | 97 | 21 | 30 | 31 | 15 | 59 | 86 | 28 | 15 | 28 | 15 |
| 60 | 98 | 0 | 1 | 20 | 77 | 60 | 92 | 0 | 3 | 24 | 65 |

# APPENDIX D

# DATA FOR BASIC LITERACY LEVEL

Table 23

RESULTS OF BASIC SKILLS QUESTIONNAIRE

Basic Literacy Skills

EMPHASIS

| Skill Number | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| **III. Identification of Numerals** | | | | | |
| 1 | 126 | 8 | 10 | 32 | 76 |
| 2 | 127 | 11 | 13 | 55 | 48 |
| 3a | 126 | 4 | 16 | 46 | 60 |
| 3b | 113 | 3 | 20 | 49 | 41 |
| 4 | 124 | 2 | 8 | 33 | 81 |
| 5 | 125 | 6 | 11 | 41 | 67 |
| 6 | 124 | 18 | 22 | 41 | 43 |
| **IV. Operations With Numbers** | | | | | |
| 7 | 124 | 29 | 19 | 40 | 36 |
| 8 | 125 | 3 | 10 | 41 | 71 |
| 9 | 126 | 1 | 2 | 7 | 116 |
| 10 | 126 | 1 | 7 | 16 | 102 |
| 11 | 125 | 1 | 7 | 16 | 101 |
| 12 | 126 | 4 | 2 | 8 | 112 |
| 13 | 126 | 4 | 7 | 16 | 99 |
| 14 | 126 | 4 | 2 | 10 | 110 |

Table 23 - continued

| Skill Number | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 15 | 126 | 8 | 7 | 24 | 87 |
| 16 | 124 | 7 | 16 | 29 | 72 |
| 17 | 125 | 12 | 20 | 31 | 62 |
| 18 | 123 | 24 | 13 | 33 | 53 |
| 19a | 124 | 34 | 18 | 44 | 28 |
| 19b | 119 | 35 | 22 | 40 | 22 |
| 19c | 121 | 33 | 27 | 38 | 23 |
| 20 | 126 | 3 | 9 | 27 | 87 |
| 21 | 126 | 6 | 12 | 53 | 55 |
| 22 | 125 | 32 | 36 | 42 | 15 |

V. Measurement Without Number

| | | | | | |
|---|---|---|---|---|---|
| 23 | 124 | 4 | 11 | 35 | 74 |
| 24 | 125 | 11 | 27 | 50 | 37 |
| 25 | 123 | 23 | 29 | 43 | 28 |
| 26 | 122 | 21 | 38 | 43 | 20 |

VI. Measurement With Number

| | | | | | |
|---|---|---|---|---|---|
| 27 | 126 | 11 | 29 | 54 | 32 |
| 28 | 126 | 7 | 11 | 52 | 56 |
| 29 | 125 | 24 | 38 | 36 | 27 |
| 30 | 126 | 30 | 35 | 36 | 25 |
| 31 | 120 | 38 | 36 | 40 | 6 |
| 32 | 121 | 40 | 31 | 35 | 15 |
| 33 | 120 | 8 | 23 | 41 | 48 |

Table 23 - continued

| Skill Number | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 34 | 121 | 9 | 24 | 43 | 45 |
| 35 | 124 | 9 | 20 | 42 | 53 |
| 36 | 124 | 11 | 28 | 40 | 45 |
| 37 | 122 | 45 | 33 | 30 | 14 |
| 38 | 124 | 43 | 34 | 30 | 17 |

IMPORTANCE

III. Identification of Numerals

| | | | | | |
|---|---|---|---|---|---|
| 39 | 123 | 4 | 9 | 11 | 99 |
| 40 | 123 | 6 | 10 | 45 | 62 |
| 41 | 121 | 15 | 16 | 44 | 46 |
| 42 | 124 | 12 | 7 | 42 | 63 |

IV. Operations With Numbers

| | | | | | |
|---|---|---|---|---|---|
| 43 | 123 | 4 | 4 | 12 | 103 |
| 44 | 124 | 2 | 1 | 10 | 111 |
| 45 | 123 | 4 | 3 | 14 | 102 |
| 46 | 120 | 10 | 10 | 27 | 73 |
| 47 | 121 | 10 | 11 | 26 | 74 |
| 48 | 124 | 7 | 14 | 30 | 73 |
| 49 | 121 | 13 | 11 | 29 | 68 |
| 50 | 122 | 18 | 10 | 31 | 63 |
| 51a | 122 | 29 | 19 | 42 | 32 |

Table 23 - continued

| Skill Number | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 51b | 121 | 30 | 23 | 36 | 32 |
| 51c | 121 | 29 | 26 | 35 | 31 |
| 52 | 122 | 31 | 27 | 48 | 16 |
| 53 | 121 | 6 | 6 | 32 | 77 |

V. Measurement Without Number

| | | | | | |
|---|---|---|---|---|---|
| 54a | 122 | 15 | 21 | 56 | 30 |
| 54b | 120 | 13 | 26 | 54 | 27 |

VI. Measurement With Number

| | | | | | |
|---|---|---|---|---|---|
| 55a | 123 | 9 | 5 | 39 | 70 |
| 55b | 123 | 7 | 19 | 50 | 47 |
| 55c | 121 | 10 | 21 | 56 | 34 |
| 55d | 123 | 13 | 24 | 53 | 33 |
| 55e | 124 | 15 | 25 | 58 | 26 |
| 56 | 120 | 2 | 15 | 36 | 67 |
| 57 | 123 | 6 | 16 | 47 | 54 |
| 58 | 124 | 5 | 20 | 37 | 62 |
| 59 | 121 | 32 | 27 | 43 | 19 |

Table 24

BASIC LITERACY

NUMBER OF YEARS OF TEACHING EXPERIENCE

| 0 to 5 Years Experience | | | | | | | More Than 5 Years Experience | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | EMPHASIS | | | | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
| III. Identification of Numerals | | | | | | | | | | | |
| 1 | 41 | 3 | 1 | 10 | 27 | 1 | 84 | 5 | 9 | 22 | 48 |
| 2 | 41 | 6 | 4 | 21 | 10 | 2 | 85 | 5 | 9 | 34 | 37 |
| 3a | 41 | 1 | 6 | 15 | 19 | 3a | 84 | 3 | 10 | 31 | 40 |
| 3b | 34 | 1 | 9 | 15 | 9 | 3b | 78 | 2 | 11 | 34 | 31 |
| 4 | 40 | 1 | 1 | 16 | 22 | 4 | 83 | 1 | 7 | 17 | 58 |
| 5 | 40 | 2 | 2 | 18 | 18 | 5 | 84 | 4 | 9 | 23 | 48 |
| 6 | 41 | 3 | 9 | 19 | 10 | 6 | 82 | 15 | 12 | 22 | 33 |
| IV. Operations With Number | | | | | | | | | | | |
| 7 | 40 | 6 | 9 | 20 | 5 | 7 | 83 | 22 | 10 | 20 | 31 |
| 8 | 41 | 2 | 2 | 17 | 20 | 8 | 83 | 1 | 8 | 24 | 50 |

Table 24 - continued

| Skills | Total Responses | 1 | 2 | 3 | 4 | Skills | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 41 | 0 | 0 | 3 | 38 | 9 | 84 | 1 | 2 | 4 | 77 |
| 10 | 41 | 0 | 1 | 6 | 34 | 10 | 84 | 1 | 6 | 10 | 67 |
| 11 | 40 | 0 | 1 | 5 | 34 | 11 | 84 | 1 | 6 | 11 | 66 |
| 12 | 41 | 0 | 1 | 0 | 40 | 12 | 84 | 4 | 1 | 8 | 71 |
| 13 | 41 | 1 | 2 | 3 | 35 | 13 | 84 | 3 | 5 | 13 | 63 |
| 14 | 41 | 0 | 1 | 3 | 37 | 14 | 84 | 4 | 1 | 7 | 72 |
| 15 | 41 | 0 | 3 | 7 | 31 | 15 | 84 | 8 | 4 | 17 | 55 |
| 16 | 40 | 1 | 5 | 20 | 14 | 16 | 83 | 6 | 11 | 8 | 58 |
| 17 | 40 | 1 | 10 | 17 | 12 | 17 | 84 | 11 | 10 | 13 | 50 |
| 18 | 40 | 4 | 7 | 16 | 13 | 18 | 82 | 20 | 5 | 17 | 40 |
| 19a | 41 | 7 | 9 | 19 | 6 | 19a | 82 | 26 | 9 | 25 | 22 |
| 19b | 38 | 6 | 12 | 16 | 4 | 19b | 80 | 28 | 10 | 24 | 18 |
| 19c | 39 | 6 | 14 | 14 | 5 | 19c | 81 | 26 | 13 | 24 | 18 |
| 20 | 41 | 0 | 2 | 13 | 26 | 20 | 84 | 3 | 7 | 14 | 60 |
| 21 | 41 | 1 | 4 | 16 | 20 | 21 | 84 | 5 | 8 | 37 | 34 |
| 22 | 41 | 8 | 12 | 20 | 1 | 22 | 83 | 24 | 23 | 22 | 14 |

Table 24 - continued

| Skills | Total Responses | 1 | 2 | 3 | 4 | Skills | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 23 | 40 | 2 | 2 | 13 | 23 | 23 | 83 | 2 | 9 | 22 | 50 |
| 24 | 40 | 2 | 8 | 20 | 10 | 24 | 84 | 9 | 19 | 30 | 26 |
| 25 | 40 | 6 | 11 | 15 | 8 | 25 | 82 | 17 | 17 | 28 | 20 |
| 26 | 40 | 8 | 9 | 18 | 5 | 26 | 81 | 13 | 28 | 25 | 15 |
| VI. Measurement With Number | | | | | | | | | | | |
| 27 | 41 | 0 | 10 | 22 | 9 | 27 | 84 | 11 | 19 | 32 | 22 |
| 28 | 41 | 1 | 3 | 20 | 17 | 28 | 84 | 6 | 8 | 32 | 38 |
| 29 | 40 | 8 | 14 | 14 | 4 | 29 | 84 | 15 | 24 | 22 | 23 |
| 30 | 41 | 9 | 15 | 13 | 4 | 30 | 84 | 20 | 20 | 23 | 21 |
| 31 | 38 | 11 | 13 | 12 | 2 | 31 | 81 | 26 | 23 | 28 | 4 |
| 32 | 38 | 13 | 12 | 10 | 3 | 32 | 82 | 26 | 19 | 25 | 12 |
| 33 | 38 | 3 | 7 | 15 | 13 | 33 | 81 | 5 | 16 | 26 | 34 |
| 34 | 39 | 3 | 11 | 12 | 13 | 34 | 81 | 5 | 13 | 31 | 32 |
| 35 | 39 | 4 | 6 | 15 | 14 | 35 | 84 | 5 | 14 | 27 | 38 |

Table 24 - continued

| Skills | Total Responses | 1 | 2 | 3 | 4 | | Skills | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 39 | 2 | 10 | 15 | 12 | | 36 | 84 | 9 | 18 | 25 | 32 |
| 37 | 39 | 15 | 12 | 10 | 2 | | 37 | 82 | 29 | 21 | 20 | 12 |
| 38 | 39 | 13 | 15 | 8 | 3 | | 38 | 84 | 29 | 19 | 22 | 14 |
| | | | | | | IMPORTANCE | | | | | | |
| | | | | | | III. Identification of Numerals | | | | | | |
| 39 | 39 | 0 | 5 | 4 | 30 | | 39 | 83 | 4 | 4 | 7 | 68 |
| 40 | 39 | 1 | 7 | 19 | 12 | | 40 | 83 | 5 | 3 | 26 | 49 |
| 41 | 39 | 1 | 6 | 19 | 13 | | 41 | 81 | 13 | 10 | 25 | 33 |
| 42 | 39 | 1 | 3 | 17 | 18 | | 42 | 84 | 11 | 4 | 24. | 45 |
| | | | | | | IV. Operations With Numbers | | | | | | |
| 43 | 39 | 1 | 1 | 4 | 33 | | 43 | 83 | 3 | 3 | 8 | 69 |
| 44 | 39 | 0 | 1 | 3 | 35 | | 44 | 84 | 2 | 0 | 7 | 75 |
| 45 | 39 | 2 | 1 | 2 | 34 | | 45 | 83 | 2 | 2 | 12 | 67 |
| 46 | 38 | 5 | 5 | 9 | 19 | | 46 | 81 | 5 | 5 | 18 | 53 |

Table 24 - continued

| Skills | Total Responses | 1 | 2 | 3 | 4 | Skills | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | 38 | 5 | 7 | 7 | 19 | 47 | 82 | 5 | 4 | 19 | 54 |
| 48 | 39 | 0 | 6 | 18 | 15 | 48 | 84 | 7 | 8 | 11 | 58 |
| 49 | 39 | 0 | 6 | 16 | 17 | 49 | 81 | 13 | 4 | 13 | 51 |
| 50 | 39 | 1 | 7 | 16 | 15 | 50 | 82 | 16 | 3 | 15 | 48 |
| 51a | 39 | 3 | 13 | 17 | 6 | 51a | 82 | 25 | 6 | 25 | 26 |
| 51b | 39 | 5 | 14 | 15 | 5 | 51b | 81 | 24 | 9 | 21 | 27 |
| 51c | 39 | 4 | 16 | 13 | 6 | 51c | 81 | 24 | 10 | 22 | 25 |
| 52 | 39 | 6 | 15 | 17 | 1 | 52 | 82 | 25 | 12 | 31 | 14 |
| 53 | 37 | 1 | 3 | 13 | 20 | 53 | 83 | 5 | 2 | 19 | 57 |
| V. Measurement Without Number | | | | | | | | | | | |
| 54a | 39 | 4 | 11 | 20 | 4 | 54a | 82 | 11 | 10 | 36 | 25 |
| 54b | 39 | 4 | 12 | 19 | 4 | 54b | 80 | 9 | 14 | 35 | 22 |
| VI. Measurement With Number | | | | | | | | | | | |
| 55a | 39 | 0 | 3 | 16 | 20 | 55a | 83 | 9 | 2 | 23 | 49 |

Table 24 - continued

| Skills | Total Responses | 1 | 2 | 3 | 4 | Skills | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 55b | 39 | 0 | 7 | 20 | 12 | 55b | 83 | 7 | 12 | 30 | 34 |
| 55c | 38 | 2 | 8 | 22 | 6 | 55c | 82 | 8 | 12 | 34 | 28 |
| 55d | 39 | 2 | 9 | 22 | 6 | 55d | 83 | 11 | 14 | 31 | 27 |
| 55e | 39 | 3 | 9 | 22 | 5 | 55e | 84 | 12 | 15 | 36 | 21 |
| 56 | 39 | 0 | 5 | 14 | 20 | 56 | 80 | 2 | 10 | 22 | 46 |
| 57 | 38 | 0 | 6 | 18 | 14 | 57 | 84 | 6 | 9 | 29 | 40 |
| 58 | 39 | 1 | 8 | 13 | 17 | 58 | 84 | 4 | 12 | 24 | 44 |
| 59 | 38 | 10 | 12 | 14 | 2 | 59 | 82 | 21 | 15 | 29 | 17 |

Table 25

BASIC LITERACY

NUMBER OF MATHEMATICS COURSES

| No Mathematics Course in Last 5 Years | | | | | | | 1 or More Mathematics Courses in Last 5 Years | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | EMPHASIS | | | | | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
| III. Identification of Numerals | | | | | | | | | | | | |
| 1 | 32 | 2 | 4 | 6 | 20 | | 1 | 89 | 6 | 5 | 25 | 53 |
| 2 | 32 | 4 | 5 | 10 | 13 | | 2 | 90 | 6 | 8 | 43 | 33 |
| 3a | 32 | 2 | 5 | 12 | 13 | | 3a | 89 | 1 | 11 | 33 | 44 |
| 3b | 30 | 1 | 8 | 11 | 10 | | 3b | 78 | 2 | 12 | 36 | 28 |
| 4 | 31 | 1 | 3 | 7 | 20 | | 4 | 88 | 1 | 5 | 25 | 57 |
| 5 | 32 | 2 | 2 | 11 | 17 | | 5 | 88 | 3 | 9 | 30 | 46 |
| 6 | 32 | 8 | 6 | 5 | 13 | | 6 | 87 | 9 | 15 | 36 | 27 |
| IV. Operations With Numbers | | | | | | | | | | | | |
| 7 | 32 | 11 | 1 | 9 | 11 | | 7 | 87 | 17 | 17 | 30 | 23 |
| 8 | 32 | 1 | 5 | 11 | 15 | | 8 | 88 | 2 | 5 | 29 | 52 |
| 9 | 32 | 1 | 0 | 1 | 30 | | 9 | 89 | 0 | 1 | 6 | 82 |

Table 25 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 32 | 0 | 3 | 3 | 26 | 10 | 89 | 1 | 4 | 13 | 71 |
| 11 | 32 | 0 | 3 | 2 | 27 | 11 | 88 | 1 | 4 | 14 | 69 |
| 12 | 32 | 2 | 0 | 3 | 27 | 12 | 89 | 1 | 2 | 5 | 81 |
| 13 | 32 | 2 | 2 | 4 | 24 | 13 | 89 | 2 | 4 | 12 | 71 |
| 14 | 32 | 2 | 0 | 3 | 27 | 14 | 89 | 1 | 2 | 7 | 79 |
| 15 | 32 | 5 | 2 | 4 | 21 | 15 | 89 | 2 | 5 | 19 | 63 |
| 16 | 32 | 2 | 5 | 5 | 20 | 16 | 87 | 4 | 11 | 23 | 49 |
| 17 | 32 | 4 | 5 | 7 | 16 | 17 | 88 | 7 | 15 | 23 | 43 |
| 18 | 30 | 8 | 4 | 3 | 15 | 18 | 88 | 15 | 9 | 29 | 35 |
| 19a | 32 | 11 | 4 | 6 | 11 | 19a | 87 | 21 | 14 | 37 | 15 |
| 19b | 31 | 11 | 4 | 6 | 10 | 19b | 83 | 22 | 17 | 33 | 11 |
| 19c | 31 | 10 | 7 | 4 | 10 | 19c | 85 | 21 | 19 | 33 | 12 |
| 20 | 32 | 1 | 3 | 7 | 21 | 20 | 89 | 2 | 6 | 18 | 63 |
| 21 | 32 | 2 | 4 | 12 | 14 | 21 | 89 | 3 | 8 | 38 | 40 |
| 22 | 32 | 10 | 7 | 8 | 7 | 22 | 89 | 20 | 28 | 34 | 7 |

Table 25 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 23 | 32 | 0 | 2 | 8 | 22 | 23 | 87 | 4 | 9 | 27 | 47 |
| 24 | 32 | 4 | 7 | 9 | 12 | 24 | 88 | 7 | 19 | 40 | 22 |
| 25 | 32 | 7 | 6 | 12 | 7 | 25 | 86 | 15 | 22 | 29 | 20 |
| 26 | 31 | 6 | 8 | 10 | 7 | 26 | 86 | 13 | 28 | 32 | 13 |
| VI. Measurement With Number | | | | | | | | | | | |
| 27 | 32 | 1 | 9 | 13 | 9 | 27 | 89 | 8 | 19 | 40 | 22 |
| 28 | 32 | 1 | 3 | 15 | 13 | 28 | 89 | 5 | 7 | 36 | 41 |
| 29 | 32 | 5 | 8 | 10 | 9 | 29 | 88 | 18 | 29 | 25 | 16 |
| 30 | 32 | 6 | 8 | 10 | 8 | 30 | 89 | 23 | 25 | 26 | 15 |
| 31 | 32 | 10 | 8 | 10 | 4 | 31 | 83 | 26 | 26 | 29 | 2 |
| 32 | 32 | 11 | 7 | 11 | 3 | 32 | 84 | 26 | 23 | 24 | 11 |
| 33 | 32 | 1 | 6 | 12 | 13 | 33 | 84 | 7 | 16 | 29 | 32 |
| 34 | 32 | 3 | 6 | 12 | 11 | 34 | 84 | 5 | 17 | 29 | 33 |
| 35 | 32 | 2 | 11 | 6 | 13 | 35 | 87 | 7 | 9 | 32 | 39 |

Table 25 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 32 | 5 | 8 | 8 | 11 | | 36 | 87 | 5 | 20 | 29 | 33 |
| 37 | 31 | 17 | 5 | 6 | 3 | | 37 | 86 | 25 | 27 | 24 | 10 |
| 38 | 32 | 14 | 7 | 4 | 7 | | 38 | 87 | 27 | 26 | 25 | 9 |
| | | | | | | IMPORTANCE | | | | | | |
| | | | | | | III. Identification of Numerals | | | | | | |
| 39 | 32 | 2 | 3 | 3 | 24 | | 39 | 86 | 1 | 6 | 6 | 73 |
| 40 | 32 | 3 | 5 | 10 | 14 | | 40 | 86 | 2 | 5 | 33 | 46 |
| 41 | 31 | 6 | 2 | 12 | 11 | | 41 | 85 | 8 | 13 | 30 | 34 |
| 42 | 32 | 4 | 2 | 9 | 17 | | 42 | 87 | 7 | 5 | 32 | 43 |
| | | | | | | IV. Operations With Numbers | | | | | | |
| 43 | 32 | 1 | 1 | 0 | 30 | | 43 | 86 | 3 | 3 | 11 | 69 |
| 44 | 32 | 1 | 0 | 2 | 29 | | 44 | 87 | 1 | 1 | 7 | 78 |
| 45 | 32 | 1 | 0 | 6 | 25 | | 45 | 86 | 2 | 3 | 8 | 73 |
| 46 | 32 | 4 | 1 | 6 | 21 | | 46 | 83 | 4 | 9 | 20 | 50 |

Table 25 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | 32 | 4 | 1 | 7 | 20 | 47 | 84 | 4 | 10 | 18 | 52 |
| 48 | 32 | 4 | 3 | 5 | 20 | 48 | 87 | 2 | 11 | 25 | 49 |
| 49 | 32 | 8 | 3 | 4 | 17 | 49 | 84 | 4 | 8 | 24 | 48 |
| 50 | 32 | 10 | 1 | 5 | 16 | 50 | 85 | 7 | 9 | 25 | 44 |
| 51a | 32 | 11 | 4 | 7 | 10 | 51a | 85 | 16 | 14 | 34 | 21 |
| 51b | 31 | 11 | 4 | 6 | 10 | 51b | 85 | 17 | 17 | 30 | 21 |
| 51c | 31 | 11 | 5 | 4 | 11 | 51c | 85 | 16 | 19 | 31 | 19 |
| 52 | 32 | 11 | 5 | 9 | 7 | 52 | 85 | 18 | 20 | 38 | 9 |
| 53 | 30 | 2 | 0 | 7 | 21 | 53 | 86 | 2 | 6 | 23 | 55 |
| V. Measurement Without Number | | | | | | | | | | | |
| 54a | 32 | 5 | 6 | 11 | 10 | 54a | 85 | 8 | 14 | 44 | 19 |
| 54b | 31 | 4 | 6 | 12 | 9 | 54b | 85 | 8 | 19 | 41 | 17 |
| VI. Measurement With Number | | | | | | | | | | | |
| 55a | 32 | 5 | 1 | 10 | 16 | 55a | 86 | 3 | 4 | 27 | 52 |
| 55b | 32 | 4 | 2 | 11 | 15 | 55b | 86 | 2 | 15 | 38 | 31 |

Table 25 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 55c | 31 | 5 | 6 | 8 | 12 | 55c | 85 | 4 | 14 | 46 | 21 |
| 55d | 32 | 5 | 9 | 8 | 10 | 55d | 86 | 7 | 14 | 43 | 22 |
| 55e | 32 | 6 | 8 | 8 | 10 | 55e | 87 | 8 | 15 | 48 | 16 |
| 56 | 31 | 1 | 4 | 9 | 17 | 56 | 84 | 0 | 9 | 26 | 49 |
| 57 | 32 | 3 | 6 | 10 | 13 | 57 | 86 | 2 | 9 | 35 | 40 |
| 58 | 32 | 2 | 8 | 7 | 15 | 58 | 87 | 2 | 11 | 28 | 46 |
| 59 | 32 | 11 | 7 | 7 | 7 | 59 | 84 | 19 | 18 | 35 | 12 |

Table 26

BASIC LITERACY

AMOUNT OF TIME SPENT TEACHING MATHEMATICS PER DAY

| 40 or Less Minutes Per Day | | | | | | | More Than 40 Minutes Per Day | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emphasis | | | | | | | Emphasis | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
| III. Identification of Numerals | | | | | | | | | | | | |
| 1 | 20 | 3 | 2 | 6 | 9 | 1 | 104 | 5 | 8 | 26 | 65 |
| 2 | 20 | 4 | 3 | 12 | 1 | 2 | 105 | 7 | 10 | 42 | 46 |
| 3a | 19 | 1 | 2 | 8 | 8 | 3a | 105 | 3 | 14 | 38 | 50 |
| 3b | 19 | 0 | 5 | 8 | 6 | 3b | 92 | 3 | 15 | 40 | 37 |
| 4 | 19 | 0 | 0 | 7 | 12 | 4 | 103 | 2 | 8 | 26 | 67 |
| 5 | 19 | 2 | 1 | 6 | 10 | 5 | 104 | 4 | 10 | 35 | 55 |
| 6 | 19 | 3 | 3 | 6 | 7 | 6 | 103 | 15 | 19 | 33 | 36 |
| IV. Operations With Numbers | | | | | | | | | | | | |
| 7 | 19 | 4 | 6 | 3 | 6 | 7 | 103 | 25 | 13 | 35 | 30 |
| 8 | 19 | 0 | 2 | 6 | 11 | 8 | 104 | 3 | 8 | 34 | 59 |
| 9 | 19 | 0 | 1 | 1 | 17 | 9 | 105 | 1 | 1 | 6 | 97 |

Table 26 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 19 | 0 | 1 | 3 | 15 | 10 | 105 | 1 | 6 | 13 | 85 |
| 11 | 19 | 0 | 1 | 4 | 14 | 11 | 104 | 1 | 6 | 12 | 85 |
| 12 | 19 | 1 | 1 | 2 | 15 | 12 | 105 | 3 | 1 | 6 | 95 |
| 13 | 19 | 0 | 3 | 0 | 16 | 13 | 105 | 4 | 4 | 16 | 81 |
| 14 | 19 | 1 | 1 | 2 | 15 | 14 | 105 | 3 | 1 | 8 | 93 |
| 15 | 19 | 1 | 2 | 0 | 16 | 15 | 105 | 7 | 5 | 24 | 69 |
| 16 | 19 | 2 | 3 | 4 | 10 | 16 | 103 | 5 | 13 | 25 | 60 |
| 17 | 19 | 2 | 4 | 5 | 8 | 17 | 104 | 10 | 16 | 25 | 53 |
| 18 | 19 | 3 | 2 | 8 | 6 | 18 | 102 | 21 | 11 | 23 | 47 |
| 19a | 19 | 5 | 2 | 9 | 3 | 19a | 103 | 29 | 16 | 33 | 25 |
| 19b | 18 | 4 | 4 | 8 | 2 | 19b | 99 | 31 | 18 | 30 | 20 |
| 19c | 18 | 4 | 5 | 7 | 2 | 19c | 101 | 29 | 22 | 29 | 21 |
| 20 | 19 | 0 | 1 | 6 | 12 | 20 | 105 | 3 | 8 | 21 | 73 |
| 21 | 19 | 2 | 2 | 6 | 9 | 21 | 105 | 4 | 10 | 47 | 44 |
| 22 | 19 | 4 | 5 | 6 | 4 | 22 | 104 | 28 | 31 | 34 | 11 |

Table 26 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 23 | 18 | 0 | 2 | 6 | 10 | 23 | 104 | 4 | 9 | 29 | 62 |
| 24 | 19 | 2 | 3 | 9 | 5 | 24 | 104 | 9 | 24 | 39 | 32 |
| 25 | 19 | 4 | 5 | 5 | 5 | 25 | 102 | 19 | 23 | 37 | 23 |
| 26 | 18 | 4 | 5 | 6 | 3 | 26 | 102 | 17 | 32 | 36 | 17 |
| VI. Measurement With Number | | | | | | | | | | | |
| 27 | 19 | 2 | 6 | 7 | 4 | 27 | 105 | 9 | 23 | 46 | 27 |
| 28 | 19 | 3 | 1 | 7 | 8 | 28 | 105 | 4 | 10 | 44 | 47 |
| 29 | 19 | 4 | 6 | 5 | 4 | 29 | 104 | 20 | 31 | 31 | 22 |
| 30 | 19 | 5 | 6 | 5 | 3 | 30 | 105 | 25 | 28 | 31 | 21 |
| 31 | 18 | 6 | 6 | 5 | 1 | 31 | 100 | 32 | 29 | 34 | 5 |
| 32 | 18 | 6 | 5 | 6 | 1 | 32 | 101 | 34 | 25 | 28 | 14 |
| 33 | 19 | 1 | 5 | 8 | 5 | 33 | 99 | 7 | 18 | 32 | 42 |
| 34 | 19 | 2 | 4 | 6 | 7 | 34 | 100 | 7 | 20 | 36 | 37 |
| 35 | 19 | 2 | 2 | 8 | 7 | 35 | 103 | 7 | 17 | 34 | 43 |

Table 26 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 19 | 3 | 3 | 8 | 5 | | 36 | 103 | 8 | 25 | 31 | 39 |
| 37 | 19 | 9 | 3 | 4 | 3 | | 37 | 101 | 36 | 29 | 25 | 11 |
| 38 | 19 | 9 | 2 | 5 | 3 | | 38 | 103 | 34 | 31 | 24 | 14 |
| | | | | | | IMPORTANCE | | | | | | |
| | | | | | | III. Identification of Numerals | | | | | | |
| 39 | 18 | 1 | 2 | 1 | 14 | | 39 | 103 | 3 | 7 | 10 | 83 |
| 40 | 19 | 2 | 1 | 9 | 7 | | 40 | 102 | 4 | 9 | 35 | 54 |
| 41 | 19 | 1 | 2 | 6 | 10 | | 41 | 100 | 14 | 14 | 37 | 35 |
| 42 | 19 | 1 | 1 | 6 | 11 | | 42 | 103 | 11 | 6 | 36 | 50 |
| | | | | | | IV. Operations With Numbers | | | | | | |
| 43 | 19 | 1 | 0 | 3 | 15 | | 43 | 102 | 3 | 4 | 9 | 86 |
| 44 | 19 | 0 | 1 | 3 | 15 | | 44 | 103 | 2 | 0 | 7 | 94 |
| 45 | 19 | 3 | 1 | 2 | 13 | | 45 | 102 | 1 | 2 | 12 | 87 |
| 46 | 19 | 3 | 2 | 5 | 9 | | 46 | 99 | 7 | 8 | 22 | 62 |

Table 26 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | 19 | 3 | 3 | 4 | 9 | | 47 | 100 | 7 | 8 | 22 | 63 |
| 48 | 19 | 1 | 3 | 5 | 10 | | 48 | 103 | 6 | 11 | 25 | 61 |
| 49 | 19 | 1 | 0 | 6 | 12 | | 49 | 100 | 12 | 11 | 22 | 55 |
| 50 | 19 | 2 | 0 | 9 | 8 | | 50 | 101 | 16 | 10 | 20 | 55 |
| 51a | 19 | 5 | 6 | 4 | 4 | | 51a | 101 | 24 | 13 | 36 | 28 |
| 51b | 19 | 5 | 5 | 6 | 3 | | 51b | 100 | 25 | 18 | 28 | 29 |
| 51c | 19 | 5 | 5 | 4 | 5 | | 51c | 100 | 24 | 21 | 29 | 26 |
| 52 | 18 | 5 | 3 | 8 | 2 | | 52 | 102 | 26 | 24 | 38 | 14 |
| 53 | 18 | 1 | 1 | 6 | 10 | | 53 | 101 | 5 | 5 | 26 | 65 |
| V. Measurement Without Number | | | | | | | | | | | | |
| 54a | 19 | 4 | 2 | 8 | 5 | | 54a | 101 | 11 | 19 | 46 | 25 |
| 54b | 19 | 4 | 3 | 8 | 4 | | 54b | 99 | 9 | 23 | 44 | 23 |
| VI. Measurement With Number | | | | | | | | | | | | |
| 55a | 19 | 3 | 1 | 4 | 11 | | 55a | 102 | 6 | 4 | 34 | 58 |

Table 26 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 55b | 19 | 2 | 3 | 9 | 5 | 55b | 102 | 5 | 16 | 39 | 42 |
| 55c | 19 | 3 | 2 | 11 | 3 | 55c | 100 | 7 | 18 | 44 | 31 |
| 55d | 19 | 4 | 3 | 9 | 3 | 55d | 102 | 9 | 20 | 43 | 30 |
| 55e | 19 | 4 | 3 | 9 | 3 | 55e | 103 | 11 | 21 | 48 | 23 |
| 56 | 19 | 0 | 2 | 8 | 9 | 56 | 99 | 2 | 13 | 27 | 57 |
| 57 | 18 | 1 | 1 | 10 | 6 | 57 | 103 | 5 | 14 | 37 | 47 |
| 58 | 19 | 2 | 3 | 8 | 6 | 58 | 103 | 3 | 17 | 28 | 55 |
| 59 | 18 | 6 | 5 | 5 | 2 | 59 | 101 | 26 | 21 | 37 | 17 |

Table 27

BASIC LITERACY

DATE OF MOST RECENT DEGREE

| Degree Prior to 1973 | | | | | | | Degree in 1973 or After 1973 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EMPHASIS | | | | | | | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
| III. Identification of Numerals | | | | | | | | | | | | |
| 1 | 53 | 2 | 5 | 14 | 32 | | 1 | 62 | 5 | 4 | 16 | 37 |
| 2 | 53 | 3 | 7 | 22 | 21 | | 2 | 62 | 6 | 6 | 27 | 23 |
| 3a | 52 | 0 | 7 | 18 | 27 | | 3a | 62 | 2 | 9 | 23 | 28 |
| 3b | 47 | 0 | 6 | 21 | 20 | | 3b | 57 | 2 | 14 | 23 | 18 |
| 4 | 51 | 1 | 5 | 10 | 35 | | 4 | 61 | 1 | 2 | 21 | 37 |
| 5 | 52 | 2 | 7 | 13 | 30 | | 5 | 61 | 2 | 4 | 24 | 31 |
| 6 | 51 | 9 | 9 | 10 | 23 | | 6 | 61 | 6 | 10 | 29 | 16 |
| IV. Operations With Numbers | | | | | | | | | | | | |
| 7 | 52 | 13 | 7 | 11 | 21 | | 7 | 61 | 13 | 9 | 27 | 12 |
| 8 | 51 | 1 | 1 | 14 | 35 | | 8 | 62 | 2 | 7 | 24 | 29 |
| 9 | 52 | 0 | 0 | 3 | 49 | | 9 | 62 | 0 | 1 | 4 | 57 |

Table 27 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 52 | 1 | 1 | 8 | 42 | 10 | 62 | 0 | 4 | 8 | 50 |
| 11 | 52 | 1 | 1 | 9 | 41 | 11 | 61 | 0 | 4 | 7 | 50 |
| 12 | 52 | 1 | 0 | 4 | 47 | 12 | 62 | 1 | 2 | 3 | 56 |
| 13 | 52 | 1 | 4 | 8 | 39 | 13 | 62 | 2 | 2 | 7 | 51 |
| 14 | 52 | 1 | 0 | 5 | 46 | 14 | 62 | 1 | 2 | 4 | 55 |
| 15 | 52 | 5 | 4 | 7 | 36 | 15 | 62 | 1 | 3 | 14 | 44 |
| 16 | 51 | 3 | 5 | 6 | 37 | 16 | 61 | 3 | 9 | 18 | 31 |
| 17 | 52 | 5 | 7 | 7 | 33 | 17 | 61 | 5 | 11 | 20 | 25 |
| 18 | 50 | 9 | 5 | 9 | 27 | 18 | 61 | 12 | 5 | 22 | 22 |
| 19a | 51 | 17 | 2 | 15 | 17 | 19a | 61 | 13 | 15 | 25 | 8 |
| 19b | 49 | 16 | 3 | 14 | 16 | 19b | 59 | 15 | 15 | 25 | 4 |
| 19c | 50 | 16 | 5 | 14 | 15 | 19c | 60 | 13 | 18 | 23 | 6 |
| 20 | 52 | 2 | 3 | 7 | 40 | 20 | 62 | 1 | 4 | 16 | 41 |
| 21 | 52 | 2 | 2 | 25 | 23 | 21 | 62 | 2 | 8 | 26 | 26 |
| 22 | 51 | 13 | 15 | 14 | 9 | 22 | 62 | 15 | 19 | 24 | 4 |

Table 27 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 23 | 52 | 2 | 5 | 12 | 33 | 23 | 61 | 1 | 5 | 20 | 35 |
| 24 | 52 | 3 | 10 | 17 | 22 | 24 | 61 | 5 | 15 | 31 | 10 |
| 25 | 50 | 5 | 12 | 18 | 15 | 25 | 61 | 13 | 14 | 22 | 12 |
| 26 | 50 | 4 | 15 | 19 | 12 | 26 | 60 | 11 | 20 | 22 | 7 |
| VI. Measurement With Number | | | | | | | | | | | |
| 27 | 52 | 7 | 9 | 21 | 15 | 27 | 62 | 2 | 16 | 29 | 15 |
| 28 | 52 | 2 | 5 | 19 | 26 | 28 | 62 | 4 | 3 | 28 | 27 |
| 29 | 52 | 7 | 13 | 15 | 17 | 29 | 61 | 12 | 21 | 19 | 9 |
| 30 | 52 | 9 | 11 | 16 | 16 | 30 | 62 | 16 | 20 | 18 | 8 |
| 31 | 50 | 15 | 12 | 19 | 4 | 31 | 58 | 18 | 22 | 17 | 1 |
| 32 | 51 | 16 | 10 | 14 | 11 | 32 | 58 | 18 | 19 | 17 | 4 |
| 33 | 50 | 1 | 9 | 18 | 22 | 33 | 59 | 6 | 12 | 20 | 21 |
| 34 | 50 | 2 | 9 | 17 | 22 | 34 | 59 | 4 | 13 | 22 | 20 |
| 35 | 52 | 1 | 9 | 16 | 26 | 35 | 60 | 7 | 10 | 21 | 22 |

Table 27 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 52 | 4 | 12 | 14 | 22 | | 36 | 60 | 5 | 15 | 21 | 19 |
| 37 | 50 | 17 | 12 | 13 | 8 | | 37 | 60 | 23 | 18 | 16 | 3 |
| 38 | 52 | 17 | 9 | 16 | 10 | | 38 | 60 | 23 | 21 | 13 | 3 |
| | | | | | | IMPORTANCE | | | | | | |
| | | | | | | III. Identification of Numerals | | | | | | |
| 39 | 51 | 2 | 2 | 6 | 41 | | 39 | 60 | 0 | 7 | 4 | 49 |
| 40 | 51 | 3 | 2 | 15 | 31 | | 40 | 60 | 1 | 8 | 26 | 25 |
| 41 | 50 | 7 | 7 | 13 | 23 | | 41 | 59 | 5 | 9 | 26 | 19 |
| 42 | 52 | 6 | 2 | 16 | 28 | | 42 | 50 | 4 | 5 | 24 | 27 |
| | | | | | | IV. Operations With Numbers | | | | | | |
| 43 | 51 | 2 | 3 | 4 | 42 | | 43 | 60 | 1 | 1 | 7 | 51 |
| 44 | 52 | 1 | 0 | 5 | 46 | | 44 | 60 | 0 | 1 | 4 | 55 |
| 45 | 52 | 0 | 2 | 8 | 42 | | 45 | 59 | 2 | 1 | 5 | 51 |
| 46 | 50 | 2 | 3 | 11 | 34 | | 46 | 58 | 5 | 6 | 14 | 33 |

Table 27 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | 51 | 2 | 2 | 13 | 34 | 47 | 58 | 5 | 8 | 11 | 34 |
| 48 | 53 | 5 | 4 | 7 | 37 | 48 | 59 | 0 | 8 | 22 | 29 |
| 49 | 50 | 8 | 4 | 7 | 31 | 49 | 59 | 2 | 6 | 20 | 31 |
| 50 | 51 | 11 | 2 | 8 | 30 | 50 | 59 | 4 | 7 | 21 | 27 |
| 51a | 51 | 16 | 3 | 14 | 18 | 51a | 59 | 10 | 13 | 25 | 11 |
| 51b | 50 | 14 | 5 | 12 | 19 | 51b | 59 | 13 | 15 | 21 | 10 |
| 51c | 50 | 14 | 6 | 10 | 20 | 51c | 59 | 12 | 17 | 22 | 8 |
| 52 | 51 | 16 | 4 | 22 | 9 | 52 | 59 | 12 | 21 | 23 | 3 |
| 53 | 50 | 4 | 3 | 10 | 33 | 53 | 59 | 1 | 3 | 18 | 37 |
| V. Measurement Without Number | | | | | | | | | | | |
| 54a | 51 | 4 | 7 | 21 | 19 | 54a | 59 | 7 | 12 | 31 | 9 |
| 54b | 49 | 2 | 8 | 22 | 17 | 54b | 59 | 7 | 16 | 28 | 8 |
| VI. Measurement With Number | | | | | | | | | | | |
| 55a | 51 | 3 | 3 | 15 | 30 | 55a | 60 | 4 | 1 | 21 | 34 |
| 55b | 51 | 3 | 10 | 19 | 19 | 55b | 60 | 2 | 5 | 30 | 23 |

Table 27 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 55c | 50 | 2 | 9 | 23 | 16 | 55c | 59 | 5 | 9 | 30 | 15 |
| 55d | 51 | 4 | 11 | 21 | 15 | 55d | 60 | 6 | 10 | 29 | 15 |
| 55e | 52 | 5 | 12 | 23 | 12 | 55e | 60 | 7 | 10 | 32 | 11 |
| 56 | 49 | 1 | 6 | 15 | 27 | 56 | 59 | 1 | 8 | 16 | 34 |
| 57 | 52 | 2 | 7 | 19 | 24 | 57 | 59 | 2 | 8 | 25 | 24 |
| 58 | 52 | 1 | 8 | 15 | 28 | 58 | 60 | 3 | 10 | 20 | 27 |
| 59 | 51 | 12 | 8 | 19 | 12 | 59 | 58 | 17 | 16 | 20 | 5 |

Table 28

BASIC LITERACY

BASIC SKILLS PROGRAM

| Have Basic Skills Program | | | | | | | Do Not Have Basic Skills Program | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | EMPHASIS | | | | | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
| III. Identification of Numerals | | | | | | | | | | | | |
| 1 | 34 | 3 | 3 | 3 | 25 | | 1 | 80 | 4 | 6 | 25 | 45 |
| 2 | 34 | 4 | 4 | 11 | 15 | | 2 | 80 | 5 | 8 | 39 | 28 |
| 3a | 34 | 2 | 2 | 12 | 18 | | 3a | 79 | 2 | 11 | 29 | 37 |
| 3b | 29 | 2 | 5 | 10 | 12 | | 3b | 72 | 1 | 11 | 38 | 22 |
| 4 | 32 | 1 | 2 | 8 | 21 | | 4 | 79 | 1 | 5 | 21 | 52 |
| 5 | 33 | 1 | 7 | 10 | 15 | | 5 | 79 | 5 | 4 | 27 | 43 |
| 6 | 32 | 7 | 3 | 12 | 10 | | 6 | 79 | 10 | 15 | 24 | 30 |
| IV. Operations With Numbers | | | | | | | | | | | | |
| 7 | 34 | 9 | 3 | 14 | 8 | | 7 | 77 | 16 | 14 | 22 | 25 |
| 8 | 33 | 2 | 1 | 8 | 22 | | 8 | 79 | 1 | 8 | 26 | 44 |
| 9 | 34 | 0 | 0 | 3 | 31 | | 9 | 79 | 1 | 2 | 3 | 73 |

Table 28 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 34 | 1 | 1 | 3 | 29 | 10 | 79 | 0 | 4 | 13 | 62 |
| 11 | 33 | 1 | 1 | 4 | 27 | 11 | 79 | 0 | 4 | 11 | 64 |
| 12 | 34 | 2 | 0 | 1 | 31 | 12 | 79 | 2 | 2 | 5 | 70 |
| 13 | 34 | 2 | 0 | 5 | 27 | 13 | 79 | 2 | 6 | 10 | 61 |
| 14 | 34 | 2 | 0 | 0 | 32 | 14 | 79 | 2 | 2 | 7 | 68 |
| 15 | 34 | 3 | 1 | 6 | 24 | 15 | 79 | 5 | 5 | 17 | 52 |
| 16 | 33 | 2 | 7 | 11 | 13 | 16 | 78 | 5 | 8 | 16 | 49 |
| 17 | 34 | 4 | 9 | 8 | 13 | 17 | 78 | 8 | 9 | 21 | 40 |
| 18 | 34 | 9 | 6 | 8 | 11 | 18 | 76 | 14 | 5 | 23 | 34 |
| 19a | 34 | 13 | 6 | 9 | 6 | 19a | 77 | 18 | 9 | 30 | 20 |
| 19b | 30 | 13 | 5 | 6 | 6 | 19b | 76 | 18 | 12 | 31 | 15 |
| 19c | 32 | 12 | 6 | 7 | 7 | 19c | 76 | 18 | 15 | 27 | 16 |
| 20 | 34 | 2 | 2 | 6 | 24 | 20 | 79 | 1 | 5 | 19 | 54 |
| 21 | 34 | 2 | 6 | 10 | 16 | 21 | 79 | 3 | 3 | 38 | 35 |
| 22 | 34 | 10 | 14 | 7 | 3 | 22 | 78 | 20 | 17 | 29 | 12 |

Table 28 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 23 | 34 | 2 | 2 | 5 | 25 | 23 | 77 | 2 | 6 | 26 | 43 |
| 24 | 34 | 4 | 8 | 13 | 9 | 24 | 78 | 6 | 14 | 32 | 26 |
| 25 | 34 | 8 | 9 | 8 | 9 | 25 | 76 | 12 | 17 | 29 | 18 |
| 26 | 32 | 9 | 9 | 7 | 7 | 26 | 77 | 9 | 26 | 32 | 10 |
| VI. Measurement With Number | | | | | | | | | | | |
| 27 | 34 | 2 | 9 | 15 | 8 | 27 | 79 | 8 | 17 | 34 | 20 |
| 28 | 34 | 4 | 3 | 12 | 15 | 28 | 79 | 3 | 7 | 36 | 33 |
| 29 | 34 | 8 | 15 | 5 | 6 | 29 | 78 | 13 | 19 | 28 | 18 |
| 30 | 34 | 9 | 13 | 6 | 6 | 30 | 79 | 18 | 18 | 24 | 19 |
| 31 | 34 | 14 | 10 | 7 | 3 | 31 | 75 | 23 | 21 | 28 | 3 |
| 32 | 34 | 14 | 9 | 5 | 6 | 32 | 76 | 25 | 17 | 26 | 8 |
| 33 | 33 | 2 | 7 | 10 | 14 | 33 | 76 | 5 | 12 | 29 | 30 |
| 34 | 33 | 2 | 8 | 11 | 12 | 34 | 76 | 6 | 12 | 29 | 29 |
| 35 | 34 | 2 | 4 | 13 | 15 | 35 | 78 | 6 | 13 | 25 | 34 |

Table 28 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 34 | 6 | 6 | 9 | 13 | 36 | 78 | 4 | 21 | 27 | 26 |
| 37 | 33 | 16 | 7 | 5 | 5 | 37 | 77 | 24 | 23 | 21 | 9 |
| 38 | 34 | 14 | 7 | 7 | 6 | 38 | 78 | 24 | 25 | 19 | 10 |
| | | | | | | | IMPORTANCE | | | | |
| | | | | | | | III. Identification of Numerals | | | | |
| 39 | 34 | 0 | 3 | 5 | 26 | 39 | 77 | 4 | 5 | 5 | 63 |
| 40 | 33 | 1 | 5 | 14 | 13 | 40 | 78 | 4 | 5 | 28 | 41 |
| 41 | 32 | 7 | 3 | 11 | 11 | 41 | 77 | 8 | 10 | 27 | 32 |
| 42 | 34 | 7 | 2 | 10 | 15 | 42 | 78 | 5 | 5 | 27 | 41 |
| | | | | | | | IV. Operations With Numbers | | | | |
| 43 | 34 | 1 | 0 | 4 | 29 | 43 | 77 | 2 | 4 | 8 | 63 |
| 44 | 34 | 1 | 0 | 1 | 32 | 44 | 78 | 1 | 1 | 8 | 68 |
| 45 | 34 | 1 | 1 | 1 | 31 | 45 | 77 | 3 | 2 | 10 | 62 |
| 46 | 34 | 3 | 4 | 8 | 19 | 46 | 75 | 6 | 5 | 16 | 48 |

Table 28 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | 34 | 3 | 4 | 7 | 20 | | 47 | 76 | 6 | 6 | 15 | 49 |
| 48 | 34 | 0 | 8 | 7 | 19 | | 48 | 78 | 7 | 6 | 19 | 46 |
| 49 | 33 | 3 | 6 | 7 | 17 | | 49 | 76 | 10 | 4 | 20 | 42 |
| 50 | 34 | 5 | 6 | 7 | 16 | | 50 | 76 | 11 | 4 | 21 | 40 |
| 51a | 34 | 9 | 8 | 9 | 8 | | 51a | 76 | 18 | 7 | 28 | 23 |
| 51b | 33 | 8 | 9 | 9 | 7 | | 51b | 76 | 19 | 10 | 23 | 24 |
| 51c | 33 | 7 | 11 | 9 | 6 | | 51c | 76 | 19 | 11 | 22 | 24 |
| 52 | 34 | 9 | 10 | 12 | 3 | | 52 | 76 | 20 | 13 | 30 | 13 |
| 53 | 33 | 1 | 4 | 8 | 20 | | 53 | 76 | 5 | 1 | 20 | 50 |
| V. Measurement Without Number | | | | | | | | | | | | |
| 54a | 34 | 5 | 5 | 14 | 10 | | 54a | 76 | 9 | 13 | 37 | 17 |
| 54b | 33 | 4 | 6 | 14 | 9 | | 54b | 75 | 8 | 17 | 34 | 16 |
| VI. Measurement With Number | | | | | | | | | | | | |
| 55a | 34 | 5 | 2 | 7 | 20 | | 55a | 77 | 4 | 3 | 29 | 41 |
| 55b | 34 | 2 | 6 | 8 | 18 | | 55b | 77 | 5 | 12 | 36 | 24 |

Table 28 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 55c | 32 | 2 | 8 | 9 | 13 | | 55c | 77 | 7 | 9 | 42 | 19 |
| 55d | 34 | 2 | 10 | 8 | 14 | | 55d | 77 | 9 | 11 | 38 | 19 |
| 55e | 34 | 3 | 9 | 11 | 11 | | 55e | 78 | 11 | 13 | 40 | 14 |
| 56 | 34 | 1 | 2 | 9 | 22 | | 56 | 75 | 1 | 12 | 23 | 39 |
| 57 | 34 | 3 | 4 | 11 | 16 | | 57 | 77 | 3 | 10 | 30 | 34 |
| 58 | 34 | 2 | 6 | 5 | 21 | | 58 | 78 | 3 | 11 | 27 | 37 |
| 59 | 33 | 9 | 7 | 10 | 7 | | 59 | 76 | 19 | 18 | 28 | 11 |

Table 29

BASIC LITERACY

ENROLLMENT OF SCHOOLS

| Less Than 500 | | | | | | | 500 or More | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | EMPHASIS | | | | | | | |
| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 | |
| III. Identification of Numerals | | | | | | | | | | | | |
| 1 | 57 | 3 | 5 | 11 | 38 | 1 | 57 | 4 | 4 | 17 | 32 | |
| 2 | 58 | 4 | 8 | 20 | 26 | 2 | 57 | 5 | 4 | 30 | 18 | |
| 3a | 52 | 2 | 8 | 18 | 29 | 3a | 57 | 2 | 5 | 24 | 26 | |
| 3b | 52 | 2 | 7 | 24 | 19 | 3b | 50 | 1 | 9 | 25 | 15 | |
| 4 | 57 | 1 | 5 | 12 | 39 | 4 | 55 | 1 | 2 | 17 | 35 | |
| 5 | 56 | 4 | 6 | 19 | 27 | 5 | 57 | 2 | 5 | 18 | 32 | |
| 6 | 57 | 6 | 8 | 21 | 22 | 6 | 55 | 11 | 10 | 15 | 19 | |
| IV. Operations With Numbers | | | | | | | | | | | | |
| 7 | 56 | 10 | 8 | 18 | 20 | 7 | 56 | 15 | 9 | 18 | 14 | |
| 8 | 57 | 1 | 6 | 17 | 33 | 8 | 56 | 2 | 3 | 18 | 33 | |
| 9 | 57 | 1 | 1 | 2 | 53 | 9 | 57 | 0 | 1 | 4 | 52 | |

Table 29 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 57 | 0 | 5 | 7 | 45 | 10 | 57 | 1 | 1 | 9 | 46 |
| 11 | 56 | 0 | 5 | 7 | 44 | 11 | 57 | 1 | 1 | 8 | 47 |
| 12 | 57 | 1 | 2 | 3 | 51 | 12 | 57 | 3 | 0 | 3 | 51 |
| 13 | 57 | 2 | 5 | 4 | 46 | 13 | 57 | 2 | 1 | 11 | 43 |
| 14 | 57 | 1 | 2 | 4 | 50 | 14 | 57 | 3 | 0 | 3 | 51 |
| 15 | 57 | 3 | 3 | 10 | 41 | 15 | 57 | 5 | 3 | 13 | 36 |
| 16 | 57 | 4 | 9 | 12 | 32 | 16 | 55 | 3 | 6 | 15 | 31 |
| 17 | 57 | 7 | 9 | 15 | 26 | 17 | 56 | 5 | 9 | 14 | 28 |
| 18 | 56 | 9 | 5 | 18 | 24 | 18 | 55 | 14 | 6 | 13 | 22 |
| 19a | 55 | 11 | 5 | 23 | 16 | 19a | 57 | 20 | 10 | 17 | 10 |
| 19b | 53 | 10 | 4 | 25 | 14 | 19b | 54 | 21 | 13 | 13 | 7 |
| 19c | 54 | 10 | 7 | 22 | 15 | 19c | 55 | 20 | 14 | 13 | 8 |
| 20 | 57 | 1 | 4 | 11 | 41 | 20 | 57 | 2 | 3 | 15 | 37 |
| 21 | 57 | 2 | 2 | 25 | 28 | 21 | 57 | 3 | 8 | 23 | 23 |
| 22 | 56 | 11 | 15 | 21 | 9 | 22 | 57 | 19 | 17 | 15 | 6 |

Table 29 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V. Measurement Without Number | | | | | | | | | | | |
| 23 | 56 | 1 | 6 | 14 | 35 | 23 | 56 | 3 | 3 | 17 | 33 |
| 24 | 57 | 2 | 13 | 24 | 18 | 24 | 56 | 8 | 10 | 21 | 17 |
| 25 | 55 | 7 | 13 | 15 | 20 | 25 | 56 | 13 | 14 | 22 | 7 |
| 26 | 55 | 8 | 14 | 23 | 10 | 26 | 55 | 10 | 22 | 16 | 7 |
| VI. Measurement With Number | | | | | | | | | | | |
| 27 | 57 | 4 | 12 | 28 | 13 | 27 | 57 | 7 | 14 | 21 | 15 |
| 28 | 57 | 2 | 9 | 21 | 25 | 28 | 57 | 5 | 2 | 27 | 23 |
| 29 | 57 | 10 | 15 | 17 | 15 | 29 | 57 | 11 | 20 | 16 | 10 |
| 30 | 57 | 12 | 15 | 15 | 15 | 30 | 57 | 15 | 17 | 15 | 10 |
| 31 | 54 | 15 | 16 | 18 | 5 | 31 | 56 | 22 | 16 | 17 | 1 |
| 32 | 55 | 14 | 13 | 17 | 11 | 32 | 56 | 25 | 13 | 15 | 3 |
| 33 | 55 | 2 | 6 | 24 | 23 | 33 | 55 | 6 | 13 | 15 | 21 |
| 34 | 55 | 3 | 9 | 22 | 21 | 34 | 55 | 5 | 12 | 18 | 20 |
| 35 | 57 | 4 | 8 | 20 | 25 | 35 | 56 | 4 | 10 | 18 | 24 |

Table 29 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 57 | 3 | 14 | 22 | 18 | | 36 | 56 | 7 | 12 | 13 | 24 |
| 37 | 56 | 18 | 18 | 15 | 5 | | 37 | 55 | 22 | 13 | 11 | 9 |
| 38 | 57 | 20 | 13 | 15 | 9 | | 38 | 56 | 18 | 20 | 11 | 7 |
| | | | | | | IMPORTANCE | | | | | | |
| | | | | | | III. Identification of Numerals | | | | | | |
| 39 | 57 | 3 | 5 | 4 | 45 | | 39 | 55 | 1 | 3 | 6 | 45 |
| 40 | 57 | 3 | 2 | 22 | 30 | | 40 | 55 | 2 | 8 | 20 | 25 |
| 41 | 57 | 4 | 8 | 19 | 26 | | 41 | 53 | 11 | 5 | 20 | 17 |
| 42 | 57 | 5 | 5 | 20 | 27 | | 42 | 56 | 7 | 2 | 17 | 30 |
| | | | | | | IV. Operations With Numbers | | | | | | |
| 43 | 56 | 2 | 4 | 5 | 45 | | 43 | 56 | 1 | 0 | 7 | 48 |
| 44 | 57 | 1 | 1 | 6 | 49 | | 44 | 56 | 1 | 0 | 3 | 52 |
| 45 | 57 | 2 | 2 | 7 | 46 | | 45 | 55 | 2 | 1 | 4 | 48 |
| 46 | 56 | 5 | 6 | 13 | 32 | | 46 | 54 | 4 | 3 | 11 | 36 |

Table 29 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | 57 | 5 | 7 | 11 | 34 | | 47 | 54 | 4 | 3 | 11 | 36 |
| 48 | 57 | 5 | 5 | 15 | 32 | | 48 | 56 | 2 | 9 | 11 | 34 |
| 49 | 55 | 4 | 3 | 17 | 31 | | 49 | 55 | 9 | 7 | 10 | 29 |
| 50 | 55 | 5 | 4 | 17 | 29 | | 50 | 56 | 11 | 6 | 11 | 28 |
| 51a | 55 | 6 | 8 | 22 | 19 | | 51a | 56 | 21 | 7 | 16 | 12 |
| 51b | 55 | 7 | 7 | 21 | 20 | | 51b | 55 | 20 | 12 | 12 | 11 |
| 51c | 55 | 6 | 8 | 21 | 20 | | 51c | 55 | 20 | 14 | 11 | 10 |
| 52 | 55 | 9 | 10 | 27 | 9 | | 52 | 56 | 20 | 13 | 16 | 7 |
| 53 | 56 | 2 | 2 | 15 | 37 | | 53 | 54 | 4 | 3 | 13 | 34 |
| V. Measurement Without Number | | | | | | | | | | | | |
| 54a | 55 | 4 | 7 | 29 | 15 | | 54a | 56 | 10 | 11 | 23 | 12 |
| 54b | 55 | 4 | 11 | 26 | 14 | | 54b | 54 | 8 | 12 | 23 | 11 |
| VI. Measurement With Number | | | | | | | | | | | | |
| 55a | 56 | 2 | 3 | 17 | 34 | | 55a | 56 | 7 | 2 | 20 | 27 |
| 55b | 56 | 2 | 7 | 25 | 22 | | 55b | 56 | 5 | 12 | 19 | 20 |

Table 29 - continued

| Skill | Total Responses | 1 | 2 | 3 | 4 | Skill | Total Responses | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 55c | 56 | 2 | 7 | 30 | 17 | 55c | 54 | 7 | 10 | 22 | 15 |
| 55d | 56 | 2 | 10 | 27 | 17 | 55d | 56 | 9 | 11 | 20 | 16 |
| 55e | 57 | 3 | 10 | 29 | 15 | 55e | 56 | 11 | 12 | 23 | 10 |
| 56 | 54 | 1 | 4 | 18 | 31 | 56 | 56 | 1 | 10 | 15 | 30 |
| 57 | 56 | 2 | 5 | 25 | 24 | 57 | 56 | 4 | 9 | 17 | 26 |
| 58 | 57 | 2 | 7 | 21 | 27 | 58 | 56 | 3 | 10 | 12 | 31 |
| 59 | 55 | 11 | 10 | 23 | 11 | 59 | 55 | 17 | 15 | 16 | 7 |

BIOGRAPHICAL SKETCH

Jimmie Rose Earnest Strahan was born in Slate Springs, Mississippi, on June 2, 1942. She attended Slate Springs elementary school and graduated from Calhoun City High School, Calhoun City, Mississippi, in 1959. After receiving the Associate of Arts Degree from Hinds Junior College, Raymond, Mississippi, in 1961, she attended Mississippi College, Clinton, Mississippi, from which she received the B.S. degree in 1963. She taught mathematics at Gulfport High School until 1966.

Beginning in 1966, she attended the University of Mississippi for three consecutive summer sessions as a member of a National Science Foundation Summer Institute in Mathematics receiving a Master of Combined Sciences degree in August 1968; during this period of time, she taught mathematics at Murrah High School, Jackson, Mississippi. She then accepted a position at Delta State University which institution she still serves as Acting Chairman of the Mathematics Department. In 1974-75 she was granted sabbatical leave from Delta State to pursue a doctorate in mathematics education at the University of Florida. She is a member of Phi Kappa Phi and Kappa Delta Pi. She is a charter member and past president of the Mississippi Council of Teachers of Mathematics.

She is married to Richard Denman Strahan of Mobile, Alabama.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.

Elroy J. Bolduc, Jr., Chairman
Professor of Subject Specialization
Teacher Education

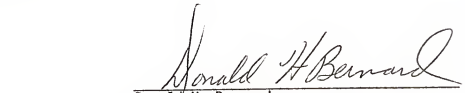
I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.

Charles W. Nelson
Professor of Mathematics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.

Eleanore L. Kantowski
Associate Professor of Subject
Specialization Teacher Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Education.



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June 1980

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